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Tooele Army Depot North Area

Appendices A, B, C, D, and E
Final Remedial Investigation Report
for
Operable Units 4-10

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Appendix A

Location-Specific ARARs and Chemical Specific ARARs

Assessment of Location-Specific ARARs for Tooele Army Depot, North and South Areas

ASSESSMENT OF LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR TOOELE ARMY DEPOT, NORTH AND SOUTH AREAS

January 27, 1992

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ASSESSMENT OF LOCATION SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR TOOELE ARMY DEPOT, NORTH AND SOUTH AREAS, UTAH

1. INTRODUCTION

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 was passed by Congress and signed into law on December 11, 1980 (Public Law 96-510). This act was intended to provide for "liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and cleanup of inactive waste disposal sites." The Superfund Amendments and Reauthorization Act (SARA), adopted on October 17, 1986 (Public Law 99-499), did not substantially alter the original structure of CERCLA, but provided extensive amendments to it.

In particular, § 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Inherent in the interpretation of applicable or relevant and appropriate requirements (ARARs) is the assumption that protection of human health and the environment is ensured. The purpose of this report is to supply a preliminary list of available federal and state location-specific ARARs that might be considered for the Tooele Army Depot, North and South Areas (TEAD) in Utah.

Location-specific requirements "set restrictions upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations" (*53 FR 51394*). In determining the use of location-specific ARARs for selected remedial actions at CERCLA sites, one must investigate the jurisdictional prerequisites of each of the regulations. Basic definitions, exemptions, etc., should be analyzed on a site-specific basis to confirm the correct application of the requirements.

The following is an explanation of the terms used throughout this report:

Applicable requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site" (*52 FR 32496*, August 27, 1987).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site" (*52 FR 32496*).

Requirements under federal or state law may be **either** applicable **or** relevant and appropriate to CERCLA cleanup actions, but not both. However, requirements must be **both** relevant **and** appropriate for compliance to be necessary. In the case where both a federal and a state ARAR are available, or where two potential ARARs address the same issue, the more stringent regulation must be selected. However, CERCLA §121(d)(4) provides several ARAR waiver options that may be

invoked, providing that the basic premise of protection of human health and the environment are not ignored. A waiver is available for state standards that have not been uniformly applied in similar circumstances across the state. In addition, CERCLA §121(d)(2)(C) forbids state standards that effectively prohibit land disposal of hazardous substances.

CERCLA on-site remedial response actions must only comply with the substantive requirements of a regulation and not the administrative requirements to obtain federal, state, or local permits [CERCLA §121(e)]. In order to ensure that CERCLA response actions proceed as rapidly as possible, the EPA has reaffirmed this position in the final National Contingency Plan (NCP) (*55 FR 8756*, March 8, 1990). **Substantive requirements** pertain directly to the actions or conditions at a site, while **administrative requirements** facilitate their implementation. The EPA recognizes that certain of the administrative requirements, such as consultation with state agencies, reporting, etc., are accomplished through the state involvement and public participation requirements of the NCP. These administrative requirements should be observed if they are useful in determining cleanup standards at the site (*55 FR 8757*).

In the absence of federal- or state-promulgated regulations, there are many criteria, advisories, guidance values, and proposed standards that are not legally binding, but may serve as useful guidance for remedial actions. These are not potential ARARs but are "to-be-considered" (TBC) guidance. These standards, etc., may be addressed in the text of this report as deemed appropriate.

2. LOCATION-SPECIFIC ARARs

Table 1 lists the major federal and state location-specific ARARs that might be pertinent to remedial actions at both N-TEAD and S-TEAD.

2.1. Caves, salt-dome formations, salt-bed formations, underground mines

The area encompassing N-TEAD and S-TEAD is characterized by broad valleys separated by linear mountains (Christenson 1991a; Weston 1991). These facilities are located in the Tooele Valley and Rush Valley, respectively. The Oquirrh Mountains are to the east of both facilities with the Stansbury Mountains to the west of N-TEAD and the Onaqui Mountains to the west of S-TEAD (EESTI 1988a; EESTI 1988b: Weston 1991). There are no indications of salt-bed formations, salt-dome formations, caves or underground mines at either site (EESTI 1988a; EESTI 1988b; Christenson 1991a; Christenson 1991b: Weston 1991). There is a gold mine located approximately 4 miles from the northeastern boundary of S-TEAD (Woods 1992). Should any of these features be discovered on the installation, the provisions of 40 CFR 264.18(c) would become implicated.

2.2. Faults

Both N-TEAD and S-TEAD are located in the Great Basin section of the Basin and Range Geologic Province (EESTI 1988a). There are fault blocks/zones to the east, west and south of the installations (EESTI 1988a). The area has some history of seismicity (classified Building Code seismic zone 3) and is considered potentially active (Christenson 1991a; EESTI 1988a). There has been extensive movement along the faults in this region since the late Miocene Epoch (EESTI 1988a). There are no known faults on N-TEAD itself (EESTI 1988a; Christenson 1991a). However, there are faults in the vicinity of the installation, such as those associated with the Northern Oquirrh Fault Zone to the east, which are indicative of Holocene

TABLE 1. Tentative Location-Specific Applicable or Relevant and Appropriate Requirements for TEAD

Location Characteristic(s)	Operating Condition(s)	Requirement(s)	Citation(s)
Faults			
• With displacement in Holocene time.	• New treatment, storage or disposal facility. • RCRA[a]-defined listed or characteristic hazardous waste (40 CFR 261) -or- RCRA- permitted facility.	• Portions of new facilities must not be within 61 meters (200 feet) of such fault.	• 40 CFR 264.18(a)
Wetlands			
• Presence of wetlands as defined in Executive Order 11990 § 7(c) and 40 CFR 6, Appendix A § 4(j).	• Agency action which involves: -acquiring, managing, and disposing of lands and facilities -providing federally undertaken, financed, or assisted construction and improvements -conducting federal activities and programs affecting land use.	• Whenever possible, agency actions must avoid or minimize adverse impacts on wetlands and act to preserve and enhance their natural and beneficial values. Agencies should particularly avoid new construction in wetlands areas unless there are no practicable alternatives. • Agency shall incorporate wetlands protection considerations into planning, regulating, and decision-making processes.	• Executive Order 11990 • 40 CFR 6.302(a) • 40 CFR 6, Appendix A
• Presence of wetlands as defined in 40 CFR 230.3(t) and 33 CFR 328.3(b).	• Agency action involving discharge of dredge or fill material into wetlands.	• Agency must take action to avoid degradation of wetlands to the extent possible. Discharges for which there are practicable alternatives with less adverse impacts or those which would cause or contribute to significant degradation are prohibited. • If adverse impacts are unavoidable, the agency must take action to enhance, restore, or create alternative wetlands.	• Clean Water Act § 404 • 40 CFR 230 • 33 CFR 320-330
Archaeologic and historic resources			
• Presence of archaeological resources on public land.		• Agency must take steps to protect archaeological resources and sites.	• Archaeological Resources Recovery Act of 1979 (16 USC 470aa-ll) • 43 CFR 7

TABLE 1. (Continued)

Location Characteristic(s)	Operating Condition(s)	Requirement(s)	Citation(s)
• Presence of archaeological or historical materials.	• Agency action involving dam construction or other alteration of terrain which might cause irreparable loss or destruction of significant scientific, prehistoric, historic, or archaeologic data.	• Agency must advise Secretary of Interior of presence of the data. • Agency must conduct survey of affected areas for resources and data and must take steps to recover, protect, and preserve data therefrom or request that DOI[b] do so.	• Archaeological and Historical Preservation Act (16 USC 469a-c) • 40 CFR 6.301
• Presence of federally owned, administered, or controlled prehistoric or historic resources or likelihood of undiscovered resources.		• Agency must identify cultural resources included on, or eligible for, inclusion on the National Register of Historic Places (36 CFR 60) or National Historic Landmark Program (36 CFR 65). • Agency must identify whether agency action(s) will affect such resources and, if so, must examine and consider alternatives to the action(s). • When alteration or destruction of the resource is unavoidable, agency must take steps to minimize or mitigate the impacts and to records and data of the resource. • When all or part of a remedial action is off-site, the consultation requirements of 16 USC 470f must be completed. • Consultation is also strongly recommended for on-site actions.	• National Historic Preservation Act (16 USC 470a-w) • Executive Order 11593 • 40 CFR 6.301 • 36 CFR 800
• Presence of sites or artifacts which are associated with current Indian, or other traditional, religious practices, rites, or ceremonies.	• Agency action which would threaten the inherent religious qualities or use associated with the site or artifacts or which would limit access thereto.	• Agency must consider the sacred or religious character of the site or artifact and its relationship to Indian or traditional freedom of religion. • Consultation with Indian or traditional native religious leaders is required for off-site actions and impacts. • Consultation is also strongly recommended for on-site actions and may be legally required for compliance with the intent of the American Indian Religious Freedom Act to protect First Amendment rights.	• American Indian Religious Freedom Act (42 USC 1996) • 43 CFR 7

TABLE 1. (Continued)

Location Characteristic(s)	Operating Condition(s)	Requirement(s)	Citation(s)
Endangered, threatened, or rare species			
• Presence of endangered or threatened species -or- critical habitat of such species as designated in 50 CFR 17, 50 CFR 226, or 50 CFR 227.	• Agency action which is likely to jeopardize species or destroy or adversely modify critical habitat.	• Agency must avoid actions which jeopardize species/habitat or take appropriate mitigation measures. • Off-site actions which affect species/habitat require consultation with DOI, FWS[c], NMFS[d], and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. • Consultation is also strongly recommended for on-site actions.	• Endangered Species Act of 1973 (16 USC 1531 *et seq.*) • 50 CFR 402 • 40 CFR 6.302(h) • Fish and Wildlife Coordination Act (16 USC 661 *et seq.*)
• Presence of endangered or threatened species or critical habitat (see above citation) of same within an aquatic ecosystem as defined in 40 CFR 230.3(c).	• Agency action involving discharge of dredge or fill material into aquatic ecosystem.	• Agency shall not discharge dredge or fill material into an aquatic ecosystem if it would jeopardize such species or would likely result in the destruction or adverse modification of a critical habitat of the species	• Clean Water Act § 404 • 40 CFR 230.10(b)

[a]RCRA = Resource Conservation and Recovery Act; definitions appear at 40 CFR 260.10.
[b]DOI = Department of Interior
[c]FWS = Fish and Wildlife Service
[d]NMFS = National Marine Fisheries

(Post Lake Bonneville) displacement (Christenson 1991a). In addition, much of S-TEAD is located on a geological feature known as the Mid-Valley Horst (Weston 1991). A Holocene fault associated with this feature runs north-south near the center of S-TEAD across the ammunition storage area and igloo area 9 (Weston 1991).

The RCRA seismic requirements for locations of treatment, storage, and disposal (TSD) facilities [40 CFR 264.18(a)] are considered ARARs for CERCLA remedial actions. Under those regulations Tooele County, Utah is one of the jurisdictions that must demonstrate compliance with requirements prohibiting such facilities within 61 meters (200 feet) of a fault with Holocene displacement (40 CFR 264.18 and Appendix IV). The Utah requirements [Utah Administrative Code (UAC) R450-8.2.9] are identical to the federal requirements in this regard. These requirements would be ARARs for any TSD facilities constructed on S-TEAD as part of the remedial process. In addition, the EPA does intend to propose additional seismic restrictions for the location of TSD facilities (NPRM March 1992; Final Rule expected March 1994). At that time, the new regulations may also become applicable to these locations.

← no faults on TEAD-N

2.3. Wilderness areas, wildlife refuges, wildlife resources, scenic rivers

There are no wilderness areas or scenic rivers on or near N-TEAD or S-TEAD. However, Utah has created the Pony Express Wildlife Management Area on Faust Creek on the southern boundary of S-TEAD. The area is a Utah state designated wetlands and waterfowl management area (Shirley 1991). Should any remedial action impacts extend to this area, the Utah Department of Wildlife Resources - Central Region in Springville, Utah should be consulted as regards any regulations that might be applicable or TBC.

2.4. Wetlands and floodplains

There are no perennial streams or rivers on N-TEAD, although the reaches of several streams flow just to the south and southwest of the installation (EESTI 1988a; U.S. Army 1991). Box Elder Wash traverses N-TEAD from the southwestern corner to the north-central boundary (Woods 1992). There are no documented floodplains on N-TEAD (Carter 1991; Anderson 1989). Some information also indicates that there are no wetlands at the site (EESTI 1988a; Weder 1991a). However, the National Wetlands Inventory (NWI) map for the installation shows a number of wetlands at N-TEAD, possibly associated with the sewage lagoons (U.S. Army 1991). It must be remembered that the NWI maps are compiled from high altitude photographs and are not purported to be absolutely accurate (Carter 1991). In addition, it is not clear whether the wetlands that appear on the NWI maps meet the jurisdictional definition of wetlands required by the statutes and regulations that would apply to such resources (U.S. Army 1991).

Although there are no perennial streams or rivers on S-TEAD, there are numerous intermittent streams that traverse the site, including Faust Creek and Ophir Creek (Weston 1991). Although no surveys are available at this time, there are indications that there may be wetlands on the site. Utah has created a Wetlands Management Area on Faust Creek, approximately 2 miles from the southern boundary of the site (Johnson, C. 1991; Weston 1991). Although there has been no formal designation, the U.S. Bureau of Land Management has developed a wetlands management area adjacent to the north central boundary of S-TEAD, which is fed by water that flows through the site in Faust Creek (Hedrick 1991). In addition, there is a surface water impoundment along the western boundary, which has been observed to form a shallow lake of several hundred acres during spring snow melt and rainy periods (Weston 1991). The water from this impoundment eventually drains to the north through Rush Valley to Rush Lake (EESTI

1988b). There is no information available as to whether this feature would fit the jurisdictional definition of wetlands.

Floodplain maps for the S-TEAD area are currently being compiled, but are not available at this time (Johnson, 1991). The level of the 100-year floodplain has not been designated for this area (Harvey 1991). There apparently were some flooding, or water control problems, during the spring of 1983 and the spring of 1984 (Johnson, R. 1991)

Given the ambiguity and conflicting information regarding the presence of these resources, a comprehensive wetlands survey of both parts of TEAD is advisable. If wetlands that meet the jurisdictional definitions are present at the site, or would be impacted by any remedial actions, then the provisions of various laws and regulations may be ARARs for remedial actions: Executive Order 11990; 40 CFR 6 (Appendix A); 40 CFR 6.302(a); Clean Water Act § 404; 40 CFR 230; and 33 CFR 320-330. If floodplains are identified at S-TEAD, 40 CFR 264.18(b), Executive Order 11988, 40 CFR 6.302(b) and 40 CFR 6 (Appendix A) would be applicable to any remedial action that impacts those resources. In addition, the EPA does intend to propose additional floodplain restrictions for the location of TSD facilities (NPRM March 1992; Final Rule expected March 1994).

2.5. Archaeological resources and historic sites

In 1984, a report was prepared for the U. S. Department of Interior on the potential historic buildings at TEAD (Building Technologies, Inc. 1981). However, it is not clear whether all the structures on the depot were surveyed or identified (Schirer 1989). The conclusion, at the time of the report, was that none of the buildings at the installation were of "archaeological, historical or technological significance" (Building Technologies, Inc. 1984). There has been no systematic survey of the installation for archaeological resources (Weder 1991a). Preliminary indications from rudimentary surveys done for other purposes at the installation have indicated that there are, indeed, archaeological and historic resources present (Weder 1991a).

A petroglyph, which may be eligible for the National Register of Historic Places (36 CFR 60), has been located in the northeastern portion of N-TEAD (Weder 1991a; EESTI 1988a). There is additional evidence of prehistoric habitation near the western boundary of N-TEAD (Weder 1991a). There are also structures there that apparently date from the prehistoric Freemont period and are associated with a Freemont community on South Willow Creek (EESTI 1988a). Finally, a prehistoric campsite has been tentatively identified at the TNT Washout Lagoon at N-TEAD (Weder 1991a).

At S-TEAD, a prehistoric camp site was located in the central region of that site, to the east of the Chemical Agent Storage Area (Weder 1991b) In addition, an old homestead and trash dump containing late 19th and early 20th century artifacts is located south of the main entrance (Weder 1991b). A cemetery is also located in the north central part of S-TEAD (EESTI 1988b).

Before any remedial actions are undertaken at the depot, a systematic survey of the historic and archaeological resources should be undertaken. The National Historic Preservation Act of 1966 (16 USC 470 *et seq.*) mandates that federal agencies have a positive duty to "locate, inventory, and nominate" properties under their control that are eligible for the National Register. Properties that are eligible for the Register are protected under the Act, whose provisions would be ARAR for remedial actions at N-TEAD. Similarly, the Archaeological Resources Protection

Act of 1979 (16 USC 470aa-ll) creates positive duties for federal agencies with regard to identifying and protecting archaeological resources. Its substantive provisions would be applicable to remedial actions at N-TEAD. In addition, the provisions of 16 USC 469a-l, 36 CFR 800, 36 CFR 65 and Executive Order 11593 may also apply.

2.6. Rare, threatened, or endangered species

Both the bald eagle (*Halieetus leucocephalus*) and the peregrine falcon (*Falco peregrinus*), which are federal endangered species, are known to occur on, or in the vicinity of N-TEAD (U.S. Army 1991; EESTI 1988a). The bald eagle uses S-TEAD as a feeding area and the area encompassing both S-TEAD and N-TEAD is considered important habitat for the species (Weder 1991a; U.S. Army 1991; EMD Memo 1991; EESTI 1988a). In addition, nesting pairs of the long billed curlew (*Numenius americanus*), a federal candidate species, were noted along the western boundary of S-TEAD in 1991 (EMD Memo 1991). Another federal candidate species, the ferruginous hawk (*Buteo regalis*), was also sighted on S-TEAD in 1991 (EMD Memo 1991). Additionally, there are a number of other federal candidate and state sensitive species that are potentially present at TEAD, although there have been no specific sightings (EMD Memo 1991). For a list of these species and relevant habitat information please see the Environmental Management Division Memorandum of August 15, 1991, cited herein as EMD Memo 1991.

There are apparently no endangered plant species on the installation, although two federal candidate species, Ute's lady's tresses (*Spiranthes diluvialis*) and *Cryptantha compacta* may possibly occur (EMD Memo 1991; U.S. Army 1991; EESTI 1988a). However, there has been no inventory of the installation and it is suggested that this be done before any remedial actions are taken.

Should remedial actions affect any endangered or threatened species or their critical habitat, ARARs could derive from the Endangered Species Act of 1973 (16 USC 1531 *et seq.*), 50 CFR 402, 40 CFR 6.302(h), and the Fish and Wildlife Coordination Act (16 USC 661 *et seq.*). The Utah state endangered species list for animals encompasses those species on the federal list (Quinn 1991). The plant list is maintained by the Utah Heritage Program and is not a part of Utah state laws or regulations per se (Quinn 1991). However, the Utah Division of Wildlife Resources normally consults with any federal or state agency whose actions may threaten or adversely affect not only threatened or endangered species, but any other species of concern at a given location (Quinn 1991). Such consultation would be mandatory for off-site actions or impacts and is strongly recommended for on-site actions that affect the indigenous animal populations. Correspondingly, the Utah Heritage Program should be consulted regarding potential disturbance of plant species.

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Assessment of Chemical-Specific ARARs for Tooele Army Depot, North and South Areas

ASSESSMENT OF CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR TOOELE ARMY DEPOT, NORTH AND SOUTH AREAS, UTAH

DRAFT REPORT

August 25, 1992

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1. INTRODUCTION

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) was passed by Congress and signed into law on December 11, 1980 (Public Law 96-510). This act was intended to provide for "liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive waste disposal sites." The Superfund Amendments and Reauthorization Act (SARA), adopted on October 17, 1986 (Public Law 99-499), did not substantially alter the original structure of CERCLA but provided extensive amendments to it.

In particular, Title I, § 121 of SARA specifies that for any hazardous substance, pollutant, or contaminant that remains on-site, the level or standard of control that must be met shall be at least that of any legally applicable or relevant and appropriate regulation (ARAR), standard, criteria, or limitation under any federal environmental law or any more stringent standard promulgated under state environmental or facility siting law. Inherent in the interpretation of ARARs is the assumption that protection of human health and the environment is ensured.

The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) has asked the support of the Chemical Hazard Evaluation Group in the Health and Safety Research Division at Oak Ridge National Laboratory (ORNL) for assistance in determining ARARs for Tooele Army Depot (TEAD) - North and South Areas, Tooele, Utah. The North Area (TEAD-N) is currently listed on the National Priorities List (NPL) (52 FR 27620, July 22, 1987) due to contamination at the old TNT washout evaporation/percolation (E/P) ponds. Supporting documentation for this report includes the TEAD Installation Assessment (USATHAMA 1979), the TEAD Preliminary Assessment/Site Investigation (PA/SI) - Volume I North Area and Facilities at Hill Air Force Base (EESTI 1988), and the Final Draft Report of Remedial Investigation for Tooele Army Depot - North Area (Weston 1990). A RCRA Phase I RFI has been conducted for the South Area (TEAD-S) (Ebasco 1992) as a requirement of Module VII - Corrective Action for Solid Waste Management Units (SWMUs) in TEAD-S, Chemical Stockpile Disposal Plant Permit.

TEAD is situated in the Great Basin Section of the Basin and Range Physiographic Province in west central Utah. TEAD is bounded on the east by the Oquirrh Mountains and on the west by the Stansbury Mountains. Undeveloped areas immediately adjacent to TEAD are used for pasture, rangeland grazing, and cultivation. Mining of metals has occurred in the Oquirrh Mountains and Mercur Creek (north of TEAD-S) for several years. The North Area is situated on the desert floor of the Tooele Valley. The North Area encompasses 10,007 hectares and is located approximately 57 km southwest of Salt Lake City, Utah. The facility has operated as a supply depot providing for receipt, storage, issue, maintenance, and disposal of assigned commodities, including ammunition, combat vehicles, bulk chemical agents and chemical weapons. After World War II, the mission was expanded to include the support of other Army installations in the western U.S. (USATHAMA 1979). TEAD-S encompasses 19,355 acres and is located in a separate valley, Rush Valley, approximately 17 miles south of TEAD-N and 35 miles southwest of

Salt Lake City. The primary mission of the facility is that of storage and maintenance of bulk chemical agents and chemical weapons (Ebasco 1992).

There are no permanent streams or rivers in either the North or South Areas of TEAD. All streambeds within the depot boundaries carry intermittent flow, which is primarily runoff from mountain snowmelt. The primary intermittent creeks in TEAD-N are South Willow Creek and Box Elder Wash and the primary intermittent systems entering TEAD-S are Ophir Creek, Mercur Creek, and Faust Creek. Water from these streams is either diverted for irrigation, infiltrated to the groundwater, or lost by evapotranspiration. Any generated drainage from the North Area moves north toward the Great Salt Lake. A small amount of the surface water in the South Area reaches Rush Lake at the northern boundary of the valley where it is evaporated. The State of Utah, under Utah Administrative Code (UAC) R317-2-13, has classified Ophir Creek as "3A" for the protection of cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chains and as "4" for the protection of agricultural uses, including irrigation and watering of stock. Rush Lake is designated "2B" for protection of boating, water skiing and similar uses (excluding swimming) and "3B" for protection of warm water species of game fish and other warm water aquatic life, including necessary aquatic organisms in their food chains. The Great Salt Lake is classified as "6" for waters requiring protection when conventional uses as identified in other classes do not apply. However, due to the intermittent nature of the surface waters at TEAD-N and TEAD-S, the systems are not hydrologically connected to any waste ponds, lagoons, ditches, or craters and thus, are not impacted. Consequently, no ARARs develop for this media and associated sediments. Significant contamination in the waters and sediments of the waste ponds and lagoons at these sites will be addressed during remediation of the sites.

The principal aquifer at TEAD is in the granular strata within the valley fill. Groundwater recharge is primarily via infiltration of mountain streams and precipitation within the drainage basin. Groundwater flow generally follows ground contours north toward Great Salt Lake, which is the major discharge area for the regional groundwater system at TEAD. A regional divergence occurs in Rush Valley, with the groundwater in the southeastern portion of TEAD-S flowing south and east. Groundwater in the aquifer underlying TEAD-N at depths between 103 and 190 meters supplies domestic water to six wells in the North Area and to the towns of Grantsville, Erda, and Tooele (USATHAMA 1979). There are also two active potable wells in the northeast corner of TEAD-S.

During a Preliminary Assessment/Site Investigation (PA/SI) for TEAD-N, EESTI (1988) investigated 19 sites on-post and 3 sites off-post as potential sources of environmental contamination. Four sites [TNT Washout Facility Area, Former Transformer Storage Area, PCB Spill Site, Open Burn/Open Detonation (OB/OD) Grounds] were considered to present a significant potential threat to human health and the environment. Sampling results indicated that no threat was posed at the Transformer Storage Area, the PCB Spill Site, or the OB/OD Grounds; however, significant contamination of the soils and groundwater had occurred at the TNT Washout Facility Area from leaching of explosives from the sediments of the TNT Washout Ponds and seepage of effluent from the Laundry Effluent Pond. It was determined that 14 sites on-post and 1 site off-post were not posing a threat to human health and the environment. Further investigations were recommended for 7 on-post sites (Barrel Storage Area, Sewage Lagoon, Munition Sawing Site, Chemical Range, Surveillance Test Site, X-Ray Lagoon, and Sanitary Landfill) and for 2 off-post sites (Bauer Mine Trailings Site and Anaconda Deep Mine

Site). Subsequently, Weston (1990) conducted a Remedial Investigation for TEAD-N focusing on five areas that were identified in the previous investigations as potential sources of contamination: 1) TNT Washout Facility, 2) Sanitary Landfill, 3) Drum Storage Areas, 4) Old Burn Area, and 5) Chemical Range. The purpose of the RI was to better define the contamination at the TNT Washout Facility and to determine the extent of contamination at the other areas. Weston (1990) concluded that site-related contamination by explosives had occurred in the subsurface soils, shallow perched groundwater, and regional aquifer at the TNT Washout Facility and that contamination by metals and volatile organic compounds (VOCs) had occurred in the regional aquifer underlying the Sanitary Landfill. Soil contamination by polynuclear aromatic hydrocarbons (PAHs) was detected in surface soils at the Drum Storage Area. Metals were also detected in the groundwater at this site at concentrations exceeding background. Sampling was hampered at the Old Burn Area and the Chemical Range due to the presence of unexploded ordinance; however, metals were detected in surface soils at the Chemical Range at concentrations exceeding background levels. Remediation of the groundwater and soils at the TNT Washout Facility was recommended (Weston 1990).

Ebasaco (1992) conducted a Phase I RCRA Facility Investigation (RFI) at TEAD-S to identify the presence or absence of contamination at 27 suspected releases solid waste management units (SWMUs) and at 8 meteorological stations. The SWMUs are primarily munitions disposal, storage, and washout areas. Results of the RFI indicate that there was no contamination at 6 SWMUs and additional interim sampling was required at 10 SWMUs to determine if a Phase II study is needed. Phase II RFI studies were recommended for 9 SWMUs (# 1&4, 3, 5, 8, 9, 25, 30, 31, and 37) based on explosives contamination in the groundwater and soils from the munitions burning and burial pits and heavy metals and VOC contamination in the soils at some SWMUs. There does not appear to be widespread groundwater contamination in plumes at the site.

2. SELECTION OF ARARs

Selection of ARARs is dependent on the hazardous substances present at the site, the site characteristics and location, and the actions selected for a remedy. Thus, these requirements may be chemical-, location-, or action-specific. Chemical-specific ARARs are health- or risk-based concentration limits set for specific hazardous substances, pollutants, or contaminants. Location-specific ARARs address such circumstances as the presence of an endangered species on the site or the location of the site in a 100-year floodplain. Location-specific ARARs have been provided under separate cover. Action-specific ARARs control or restrict particular types of remedial actions selected as alternatives for cleanup of the site.

2.1. CHEMICAL-SPECIFIC ARARs

The Superfund human health evaluation process, which is conducted during the RI/FS, is composed of three phases: 1) the baseline risk assessment, 2) the refinement of preliminary remediation goals, and 3) remedial alternatives risk evaluation. The process is fully described in the USEPA Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (RAGS) (USEPA 1989). The first step in the baseline risk assessment at Superfund sites is data collection and evaluation, which involves the selection of chemicals of concern (COCs) or "indicator chemicals". This procedure identifies the chemicals that pose the greatest potential public health risk at a site and is based on site monitoring data, chemical toxicity information in

the form of toxicity factors developed by EPA, and environmental persistence and mobility of the chemicals.

Chemical-specific ARARs or "to be considered" (TBC) guidance values are subsequently selected to set protective cleanup levels for the chemicals of concern in the designated media or else indicate a safe level of discharge that may be incorporated when considering a specific remedial activity.

2.1.1. Chemicals of Potential Concern

We have developed the list of chemicals of potential concern for the North and South Areas of TEAD following the guidelines outlined in Chapter 5 of RAGS (USEPA 1989). Initially, a concentration-toxicity screening procedure, as outlined in RAGS, was used to obtain a ranking of the relative risk for each detected chemical in a specific medium. A microcomputer-based spreadsheet was used to automate the routine features of the procedure (CASIC). A risk factor for each chemical detected in a medium was calculated as the maximum detected concentration times a toxicity factor, which is the inverse of the reference dose (RfD) for noncarcinogens or the carcinogen potency factor (CPF) for carcinogens. The total risk factor for each medium is determined as the sum of the individual risk factors for each chemical detected in the medium. Subsequently, the relative risk for each chemical is the ratio of the individual chemical risk factor to the total risk factor in that medium. The most current toxicity factors used to derive the risk factor for each chemical were obtained from the EPA Integrated Risk Information System (IRIS) (USEPA 1992a) and/or the EPA Health Effects Assessment Summary Tables (USEPA 1992b). The "indicator" chemical worksheets, which show the calculation of the risk factors and relative risks for each chemical in each media, are presented in Appendix A for TEAD-N and in Appendix B for TEAD-S.

The top-scoring chemicals in the screening procedure, along with any detected chemicals for which toxicity factors are currently unavailable, were subsequently analyzed to establish a list of the chemicals posing the most significant health risks at the site. Final selection of COCs was based on evidence of human carcinogenicity, frequency of occurrence in environmental media, exceedance of acceptable intake values, exceedance of background levels, and environmental persistence and mobility.

Complete historical monitoring data for groundwater and soil at TEAD were obtained from the Installation Restoration Data Management System maintained at USATHAMA. All monitoring data have been quality assurance/quality control validated by USATHAMA (USATHAMA 1990). A total of 59 chemicals was detected in groundwater and/or soil samples obtained from TEAD-N during 1982 and from 1986 to 1990. A total of 117 chemicals was detected in groundwater and soil samples obtained from TEAD-S during 1982, 1987, 1988, 1990, and 1991.

2.1.1.1. Chemicals of Concern for TEAD-N

Potential carcinogens (13) and noncarcinogens (28) were ranked by relative risk, and a total of 16 COCs were selected from the top-ranking compounds in both toxicologic classes. Eight additional chemicals (benzo[*a*]anthracene, benzo[*b*]fluoranthene, chloride, chrysene, lead, sulfate, thallium, and trichloroethylene) for which toxicity constants are currently unavailable were

also selected. A list of the chemicals of potential concern selected for TEAD-N and supporting data is presented in Table 1. Table 2 lists chemicals with Maximum Contaminant Levels (MCLs) or proposed MCLs that were not selected as COCs for TEAD-N, primarily because the maximum detected concentration did not exceed the MCL.

Groundwater. The primary contaminants in groundwater were metals, VOCs, nitroaromatics and anions. Table 3 lists the range of concentrations, frequency of detection, certified reporting limits, and background levels for the groundwater contaminants selected for TEAD-N. Selection was based on site-related occurrence; maximum concentrations in exceedance of MCLs, proposed MCLs, or other health-based guidance values (see Table 9 for MCLs and TBC values); or potential toxicity based on relative risk ranking in CASIC. Of the chemicals selected, arsenic and benzene are classified by EPA as Group A known human carcinogens by either the oral or inhalation routes, and chromium VI is classified as Group A via inhalation. However, chromium was selected based on its systemic toxicity, not carcinogenicity.

2,4-Dinitrotoluene, RDX, and bis(2-ethylhexyl) phthalate presented approximately 96% of the carcinogenic risk to human health from groundwater contamination at the site. Approximately 98% of the noncarcinogenic risk to human health, as calculated in CASIC, can be attributed to nitrite and 1,3,5-trinitrobenzene.

Soil. The primary contaminants selected for soils at TEAD-N were metals, nitroaromatics, and polynuclear aromatic hydrocarbons. Table 4 presents information concerning the range of detected concentrations, frequency of detection, certified reporting limits, and background values for soil COCs at TEAD-S. Selection of soil COCs for TEAD-N was based on exceedance of background levels for Tooele County, exceedance of RCRA action levels, site-related occurrence, and potential toxicity based on relative risk ranking in CASIC. Maximum detected concentrations of chromium, nickel, and zinc were several times greater than background levels (see Table 4). 2,4,6-Trinitrotoluene presented 99.6% of the carcinogenic risk and 100% of the noncarcinogenic risk to human health, occurring at a maximum concentration of 3,202,500 mg/kg in boring TNTP-4 at the TNT Washout Facility. Four PAHs (benzo[*a*]pyrene, benzo[*a*]anthracene, benzo[*b*]fluoranthene, and chrysene) were selected based on their occurrence in soils at the Drum Storage Area and their carcinogenic potential.

2.1.1.2. Chemicals of Concern for TEAD-S

Potential carcinogens (27) and noncarcinogens (47) were ranked by relative risk, and a total of 38 COCs were selected from the top-ranking compounds in both toxicologic classes. Ten additional chemicals (copper, gross alpha, gross beta, isopropylmethyl phosphonic acid, lead, sulfate, thallium, total petroleum hydrocarbons, trichloroethylene, and uranium) for which toxicity constants are currently unavailable were also selected. A list of the chemicals of potential concern selected for TEAD-S and supporting data is presented in Table 5. Table 6 lists chemicals with Maximum Contaminant Levels (MCLs) or proposed MCLs that were not selected as COCs for TEAD-S, primarily because the maximum detected concentration did not exceed the MCL.

Groundwater. The primary contaminants in groundwater were metals, VOCs, nitroaromatics, anions, and radionuclides. Table 7 lists the range of concentrations, frequency of detection, certified reporting limits, and background levels for the groundwater contaminants selected for TEAD-S. Of the chemicals selected, arsenic and benzene are classified by EPA as Group A

TABLE 1. CHEMICALS OF POTENTIAL CONCERN SELECTED FOR TEAD-N

Chemical	Groundwater			Soil		
	Maximum Concentration (mg/L)	Toxicologic Class[a]	Relative Risk Ranking	Maximum Concentration (mg/kg)	Toxicologic Class[a]	Relative Risk Ranking
Metals						
Arsenic	0.110	NC	3	—	—	—
Beryllium	—	—	—	3.00	PC NC	5 15
Chromium	0.0519	NC	10	217.71	NC	5
Lead	0.070	NA	NA	200.0	NA	NA
Nickel	0.294	NC	8	81.92	NC	10
Thallium	0.0034	NA	NA	—	—	—
Zinc	2.436	NC	9	2,072	NC	9
Organic						
Benzene	0.0016	PC	6	—	—	—
Bis(2-ethylhexyl)phthalate	0.790	PC NC	3 6	—	—	—
Trichloroethylene	0.0476	NA	NA	—	—	—
Anions						
Chloride	395.42	NA	NA	—	—	—
Nitrite/Nitrate	3,050	NC	1	—	—	—
Sulfate	1,842	NA	NA	—	—	—

TABLE 1. (CONT.)

Chemical	Groundwater			Soil		
	Maximum Concentration (mg/L)	Toxicologic Class[a]	Relative Risk Ranking	Maximum Concentration (mg/kg)	Toxicologic Class[a]	Relative Risk Ranking
Nitroaromatics						
2,4-Dinitrotoluene	0.200	PC	1	80.0	PC	4
2,6-Dinitrotoluene	—	—	—	200.0	PC	2
HMX	0.0232	NC	17	95.2	NC	12
RDX	0.275	PC NC	2 4	1,000	PC NC	3 3
1,3,5-Trinitrobenzene	0.10	NC	2	90.0	NC	2
2,4,6-Trinitrotoluene	0.0374	PC NC	5 5	3,202,500	PC NC	1 1
Polynuclear Aromatic Hydrocarbons						
Benzo[*a*]anthracene	—	—	—	0.50	NA	NA
Benzo[*b*]fluoranthene	—	—	—	0.60	NA	NA
Benzo[*a*]pyrene	—	—	—	0.66	PC	6
Chrysene	—	—	—	1.65	NA	NA

[a]PC = potential carcinogen; NC = noncarcinogen; NA = not available

TABLE 2. CHEMICALS WITH MCLS THAT WERE NOT SELECTED AS CHEMICALS OF POTENTIAL CONCERN FOR TEAD-N

Chemical	MCL (µg/L)[a]	Maximum Concentration (µg/L)
Barium	2,000	488
Beryllium	4	1.6
Copper	1,300[b]	216.5
trans-1,2-Dichloroethylene	100	11.2
Fluoride	4,000	1,000
Mercury	2	0.2
Nitrate	10,000	1,000
Selenium	50	8.8
Silver	50[c]	2.6
Tetrachloroethylene	5	1.1
Toluene	1,000	13

[a] Federal Safe Drinking Water Act (SDWA) maximum contaminant level (MCL).
[b] Properly termed an "action level," not an MCL, under the federal SDWA (56 *FR* 26460, June 7, 1991; effective Decmber 7, 1992), exceedence of this level triggers initiation of corrosion control studies and treatment requirements.
[c] State MCL; the federal MCL for silver has been revoked, effective July 30, 1992 (56 *FR* 3526, January 30, 1991).

TABLE 3. RANGE OF CONCENTRATIONS, FREQUENCY OF DETECTION, CERTIFIED REPORTING LIMIT, AND BACKGROUND LEVELS FOR GROUNDWATER CHEMICALS OF CONCERN AT TEAD-N[a]

Chemical	Range of Detected Concentrations[b]	Frequency of Detection	Certified Reporting Limit[c]	Background Levels[d]
Arsenic	5.2-110.0	38.0	5.0	<10.0
Benzene	0.85-1.62	10.0	NA	1.62
Bis(2-ethylhexyl)phthalate	10.0-790.0	23.1	10 (TRL)	57.0
Chloride	1,000-395,421	100.0	125,000 (TRL)	NA
Chromium	5.0-51.4	35.0	37.5	<10.0
2,4-Dinitrotoluene	7.5-200.0	4.1	0.6	ND
HMX	12.2-23.2	10.7	1.30	ND
Lead	2.3-70.0	59.0	1.78	3.44
Nickel	5.0-294.1	38.1	9.6	<40
Nitrite/Nitrate	520-3,050,000	88.5	500 (TRL)	5.0
RDX	1.0-275.0	27.8	0.63	ND
Sulfate	1,000-1,841,842	97.0	125,000 (TRL)	186-268
Thallium	3.4	3.6	5.0	<10.0
Trichloroethylene	1.11-47.6	14.8	0.71	ND
1,3,5-Trinitrobenzene	100.0	3.4	0.56	ND
2,4,6-Trinitrotoluene	1.0-37.4	13.5	0.78	ND
Zinc	16.0-16.2	100.0	17.2	41.3

[a]All values given in µg/L.
[b]IRDMS, data printout March 1992.
[c]As reported in Weston 1990 (TRL = USATHAMA Target Reporting Limit).
[d]As reported in Weston 1990.

ND = not detected
NA = not available

TABLE 4. RANGE OF CONCENTRATIONS, FREQUENCY OF DETECTION, CERTIFIED REPORTING LIMIT, AND BACKGROUND LEVELS FOR SOIL CHEMICALS OF CONCERN AT TEAD-N[a]

Chemical	Range of Detected Concentrations[b]	Frequency of Detection	Certified Reporting Limit[c]	Background Levels[d]
Benzo[*a*]anthracene	0.06-0.5	7.9	0.3 (TRL)	NA
Benzo[*a*]pyrene	0.44-0.66	5.3	0.3 (TRL)	NA
Benzo[*b*]fluoranthene	0.22-0.6	5.3	0.3 (TRL)	NA
Beryllium	0.3-3.0	21.1	0.33	ND
Chromium	3.6-217.7	82.2	2.5	30.0
Chrysene	0.41-1.65	7.9	0.3 (TRL)	NA
2,4-Dinitrotoluene	0.51-80.0	3.1	0.42	ND
2,6-Dinitrotoluene	300.0	0.5	0.40	ND
HMX	1.28-95.2	7.5	1.27	ND
Lead	6.33-200.0	38.9	4.78	15-70
Nickel	5.0-81.9	67.3	4.8	7-15
RDX	1.67-1,000	10.6	0.98	ND
1,3,5-Trinitrobenzene	3.51-90.0	13.4	2.09	ND
2,4,6-Trinitrotoluene	2.26-3,202,500	9.7	1.92	ND
Zinc	1.0-2,072	24.7	52.0	40-80

[a]All values are given in mg/kg (ppm).
[b]IRDMS, data printout March 1992.
[c]As reported in Weston 1990 (TRL = Target Reporting Limit).
[d]As reported in Weston 1990.

NA = not available
ND = non-detected

TABLE 5. CHEMICALS OF POTENTIAL CONCERN SELECTED FOR TEAD-S

Chemical	Groundwater			Soil		
	Maximum Concentration (mg/L)	Toxicologic Class[a]	Relative Risk Ranking	Maximum Concentration (mg/kg)	Toxicologic Class[a]	Relative Risk Ranking
Metals						
Antimony	0.143	NC	6	—	—	—
Arsenic	20.0	NC	1	180.0	NC	3
Barium	—	—	—	1,600	NC	9
Beryllium	0.050	PC NC	2 23	6,317	PC NC	1 22
Cadmium	0.0473	NC	12	53.4	NC	4
Chromium	1.885	NC	5	26,500	NC	2
Copper	—	—	—	5,890	NA	NA
Lead	0.200	NA	NA	5,200	NA	NA
Mercury	—	—	—	8,639	NC	1
Nickel	0.176	NC	24	247.0	NC	13
Selenium	0.200	NC	17	—	—	—
Silver	1.00	NC	7	13.5	NC	19
Thallium	0.0047	NA	NA	—	—	—
Zinc	114.0	NC	4	2,840	NC	12
Volatile Organic Chemicals						
Benzene	0.098	PC	9	2,647	PC	1
Bromodichloromethane	0.0032	PC NC	13 46	—	—	—

TABLE 5. (CONT.)

Chemical	Groundwater			Soil		
	Maximum Concentration (mg/L)	Toxicologic Class[a]	Relative Risk Ranking	Maximum Concentration (mg/kg)	Toxicologic Class[a]	Relative Risk Ranking
VOCs (Cont.)						
Carbon tetrachloride	0.069	PC NC	7 10	—	—	—
Chloroform	0.028	PC NC	16 30	—	—	—
2-Chlorophenol	0.080	NC	20	—	—	—
1,4-Dichlorobenzene	0.123	PC	8	—	—	—
Dichloromethane	0.072	PC NC	12 34	—	—	—
N-Nitrosodiphenylamine	0.013	PC	17	—	—	—
Nitroso-*di*-*N*-propylamine	0.120	PC	1	3.3	PC	2
Pentachlorophenol	0.096	PC NC	5 27	—	—	—
Phenol	0.041	NC	50	—	—	—
Tetrachloroethylene	0.0059	NC	38	—	—	—
Trichloroethylene	0.010	NA	NA	0.005	NA	NA
Anions						
Fluoride	0.0878	NC	3	—	—	—
Nitrate	40.0	NC	19	—	—	—
Nitrite	18.0	NC	9	—	—	—
Sulfate	8,100	NA	NA	—	—	—
Nitroaromatics						
1,3-Dinitrobenzene	0.0095	NC	11	2.515	NC	7

TABLE 5. (CONT.)

	Groundwater			Soil		
Nitroaromatics (Cont.) 2,4-Dinitrotoluene	0.0883	PC	3	4.51	PC	3
2,6-Dinitrotoluene	0.0205	PC	4	4.44	PC	4
HMX	0.0126	NC	43	4.87	NC	32
Nitrobenzene	0.0375	NC	14	—	—	—
RDX	0.0158	PC NC	10 25	4.76	PC NC	9 20
Tetryl	0.019	NC	32	10.0	NC	25
1,3,5-Trinitrobenzene	0.0098	NC	8	2.29	NC	5
2,4,6-Trinitrotoluene	0.0296	PC NC	11 15	5.005	PC NC	10 15
Polynuclear Aromatic Hydrocarbons Naphthalene	3.72	NC	13	—	—	—
Phthalates *Bis*(2-ethylhexyl)phthalate	0.810	PC NC	6 16	—	—	—
Pesticide DDD	—	—	—	5.44	PC	5
Total Petroleum Hydrocarbons	—	—	—	12,800	NA	NA
Agent Breakdown Isopropylmethyl phosphonic acid	3.0	NA	NA	—	—	—
Radionuclides Gross alpha (pCi/L)	4,720	NA	NA	—	—	—
Gross beta (pCi/L)	504	NA	NA	—	—	—
Uranium (pCi/L)	121	NA	NA	—	—	—

[a]PC = potential carcinogen; NC = noncarginogen; NA = not available

TABLE 6. CHEMICALS WITH MCLS THAT WERE NOT SELECTED AS CHEMICALS OF POTENTIAL CONCERN FOR TEAD-S

Chemical	MCL (µg/L)[a]	Maximum Concentration (µg/L)
Copper	1,300[b]	124
Cyanide	200	10
1,2-Dichlorobenzene	600	78
1,1-Dichloroethylene	7	0.4
1,2-Dichloroethylene	(*cis*-) 70 (*trans*-) 100	2.9
1,2-Dichloropropane	5	0.4
Ethylbenzene	700	87.8
Mercury	2	0.9
Toluene	1,000	19.4
1,1,1-Trichloroethane	200	1.6
1,1,2-Trichloroethane	5	0.2
Xylene (total)	10,000	2,000

[a] Federal Safe Drinking Water Act (SDWA) maximum contaminant level (MCL).
[b] Properly termed an "action level," not an MCL, under the federal SDWA (56 *FR* 26460, June 7, 1991; effective December 7, 1992), exceedence of this level triggers initiation of corrosion control studies and treatment requirements.

TABLE 7. RANGE OF CONCENTRATIONS, FREQUENCY OF DETECTION, CERTIFIED REPORTING LIMIT, AND BACKGROUND LEVELS FOR GROUNDWATER CHEMICALS OF CONCERN AT TEAD-S[a]

Chemical	Range of Detected Concentrations[b]	Frequency of Detection	Certified Reporting Limit[c]	Background Levels[d]
Antimony	3.86-143.0	25.3	3.0	<38-140
Arsenic	3.09-20,000	78.8	5.0	<2.54-1,300
Benzene	0.295-98.0	14.2	0.67	NA
Beryllium	0.20-50.0	5.6	0.10	<5.0
Bis(2-ethylhexyl)phthalate	2.0-810.0	5.7	10 (TRL)	NA
Bromodichloromethane	3.2	0.8	5 (TRL)	NA
Cadmium	4.58-47.26	8.0	5.10	<4.0
Carbon tetrachloride	17.0-69.0	1.6	5 (TRL)	NA
Chloroform	0,84-28.2	22.0	5 (TRL)	NA
2-Chlorophenol	79.0-80.0	2.2	10 (TRL)	NA
Chromium	5.0-1,884	33.3	37.5	<6.0-31
1,4-Dichlorobenzene	0.346-123.4	2.5	10 (TRL)	NA
Dichloromethane	6.18-71.6	12.1	5 (TRL)	NA
1,3-Dinitrobenzene	0.99-9.5	2.9	0.61	NA
2,4-Dinitrotoluene	0.88-88.27	2.8	0.60	NA
2,6-Dinitrotoluene	16.3-20.5	1.0	0.55	NA
Fluoride	135.0-100,000	33.1	50 (TRL)	<71-55,000
Gross alpha	3.7-4,720 (pCi/L)	93.3	NA	NA
Gross beta	0.5-504 (pCi/L)	49.3	NA	NA
HMX	11.6-12.6	1.5	1.3	NA
Isopropylmethyl phosphonic acid	1.2-3,000	20.7	NA	NA
Lead	1.41-200.0	61.4	2.5	<1.3-46
Naphthalene	31.4-3,720	12.7	10 (TRL)	NA
Nickel	5.0-176.24	23.8	9.6	<34
Nitrate	30.8-40,000	68.1	500 (TRL)	NA
Nitrite	2.7-18,000	45.2	500 (TRL)	NA

TABLE 7. (CONT.)

Chemical	Range of Detected Concentrations[b]	Frequency of Detection Limit	Certified Reporting Limit[c]	Background Levels[d]
N-Nitrosodiphenylamine	2.56-37.5	1.0	1.13	NA
N-Nitrosodiphenylamine	13.0	0.7	10 (TRL)	NA
Nitroso-*di*-*N*-propylamine	115.7-119.8	1.9	10 (TRL)	NA
Pentachlorophenol	58.0-96.0	2.0	50 (TRL)	NA
Phenol	3.0-41.0	2.2	10 (TRL)	NA
Selenium	3.3-200.0	27.6	5.0	<3.0-200
Silver	0.18-1,000	23.8	0.19	<4.6
Sulfate	1.89-8,100,000	93.5	125,000 (TRL)	NA
RDX	1.9-15.8	3.3	0.63	NA
Tetrachloroethylene	0.03-5.86	1.5	5 (TRL)	NA
Tetryl	1.25-19.0	4.5	0.66	NA
Thallium	2.4-4.7	3.1	5.0	NA
Trichloroethylene	0.76-10.0	8.1	0.71	NA
1,3,5-Trinitrobenzene	0.46-9.8	5.1	0.56	NA
2,4,6-Trinitrotoluene	0.89-29.6	11.3	0.78	NA
Uranium	1.17-121.0 (pCi/L)	100.0	NA	NA
Zinc	1.0-114,000	59.1	17.2	<21-270

[a]All values are given in µg/L.
[b]IRDMS, data printout March 1992.
[c]As reported in Weston 1990 (TRL = Target Reporting Limit).
[d]As reported in Ebasco 1992.

NA = not available

known human carcinogens by either the oral or inhalation routes, and chromium VI is classified as Group A via inhalation. However, chromium was selected based on its systemic toxicity, not carcinogenicity. Selection was based on site-related occurrence; maximum concentrations in exceedance of MCLs, proposed MCLs, or other health-based guidance values (see Table 10 for MCLs and TBC values); or potential toxicity based on relative risk ranking in CASIC.

Nitroso-di-*N*-propylamine, beryllium, 2,4-dinitrotoluene, and 2,6-dinitrotoluene presented approximately 96% of the carcinogenic risk to human health from groundwater contamination at the site. Approximately 98% of the noncarcinogenic risk to human health, as calculated in CASIC, can be attributed to arsenic, uranium, fluoride, and zinc.

Soil. The primary contaminants selected for soils at TEAD-S were metals, nitroaromatics, DDD, and total petroleum hydrocarbons. Table 8 presents information concerning the range of detected concentrations, frequency of detection, certified reporting limits, and background values for soil COCs at TEAD-S. Selection of soil COCs was based on exceedance of site background levels, exceedance of RCRA action levels or concentration-based exemption levels, site-related occurrence, or potential toxicity based on relative risk ranking in CASIC. Beryllium, nitroso-di-*N*-propylamine, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and DDD presented approximately 95% of the carcinogenic risk from soil contamination at the site; whereas, mercury and chromium presented 97% of the noncarcinogenic risk. All of the metals selected, with the exception of barium, exceeded site background levels. Total petroleum hydrocarbons were selected based on site-related occurrence, detected at maximum concentrations as high as 12,800 mg/kg in soils (sample site 14-04) at SWMU 14, the Former Motor Pool.

2.1.2. Federal and State ARARs

2.1.2.1. Groundwater and Drinking Water

In the final National Contingency Plan (NCP), EPA states the preference for Safe Drinking Water Act (SDWA) MCLs and non-zero maximum contaminant level goals (MCLGs) or other health-based standards, criteria, or guidance for cleanup of Class I and II groundwater at CERCLA sites (55 FR 8732). The goal of EPA's approach to cleanup contaminated groundwater is to return usable groundwater to its beneficial use within a given time frame that is reasonable given the particular circumstances at a CERCLA site. Although not an ARAR unless promulgated, the EPA guidance on groundwater classification should be used to help in determining whether groundwater at a site falls within Class I, II, or III. Groundwater at both the North and South areas of TEAD are used as potable water supplies either on the installations or in adjacent towns (see Section 1) (Weston 1990; Ebasco 1992); consequently, groundwater at TEAD-N and TEAD-S would be considered either Class I or IIA, representing a current source of drinking water of varying value. Restoration time periods vary depending on the use classification of the groundwater and may range from one year to several decades.

Although limited in number, chemical-specific standards pertaining to water quality have been established under the SDWA in 40 CFR 141 as National Primary Drinking Water Standards (NPDWS). These regulations are applicable to public water systems that have at least 15 service connections or serve an average of at least 25 people daily at least 60 days of the year. NPDWS include MCLs and MCLGs. The MCLs are enforceable standards that take into consideration human health effects, available treatment technologies, and costs of treatment. MCLGs are

TABLE 8. RANGE OF CONCENTRATIONS, FREQUENCY OF DETECTION, CERTIFIED REPORTING LIMIT, AND BACKGROUND LEVELS FOR SOIL CHEMICALS OF CONCERN AT TEAD-S[a]

Chemical	Range of Detected Concentrations[b]	Frequency of Detection	Certified Reporting Limit[c]	Background Levels[d]
Arsenic	6.43-180.0	35.4	5.7	12-39
Barium	110-1,600	100.0	NA	NA
Benzene	0.006-2.647	8.1	0.6 (TRL)	NA
Beryllium	0.136-6.317	45.2	0.33	0.23-0.38
Cadmium	1.07-53.4	16.8	0.7	<1.2-21
Chromium	1.37-26,500	56.5	2.5	17-56
Copper	3.57-5,890	59.7	3.82	11-58
DDD	5.44	0.5	1.0 (TRL)	NA
1,3-Dinitrobenzene	2.36-2.515	2.3	0.59	NA
2,4-Dinitrotoluene	2.7-4.51	2.2	0.42	NA
2,6-Dinitrotoluene	4.22-4.44	1.0	0.40	NA
HMX	4.63-4.87	2.3	1.27	NA
Lead	4.94-5,200	39.7	4.78	9.4-250
Mercury	0.029-8,638.7	33.0	0.1	<0.03-0.32
Nickel	7.0-247.0	19.5	4.8	<2.7
Nitro-*di*-*N*-propylamine	2.84-3.3	2.7	0.3 (TRL)	NA
RDX	4.37-4.76	2.0	0.98	NA
Silver	0.063-13.5	19.4	0.65	0.09-1.8
Tetryl	3.796-10.0	2.1	0.25	NA
Total Petroleum Hydrocarbon	2.0-12,800	23.7	NA	NA
Trichloroethylene	0.005	0.9	0.14	NA
1,3,5-Trinitrobenzene	2.096-2.29	2.3	2.09	NA
2,4,6-Trinitrotoluene	4.63-5.0	2.0	1.92	NA
Zinc	2.0-2,840	45.6	52.0	46-230

[a]All values are given in mg/kg (ppm).
[b]IRDMS, data printout March 1992.
[c]As reported in Weston 1990 (TRL = Target Reporting Limit).
[d]As reported in Ebasco 1992.

NA = not available

strictly health-based standards that disregard cost or treatment feasibility and are not legally enforceable. MCLs are legally applicable to water "at the tap" but are not legally applicable to cleanup of groundwater or surface water. However, they may be considered as relevant and appropriate at TEAD-N and TEAD-S where groundwater is, or may be, used for drinking. The chemical-specific ARARs for cleanup of groundwater at both TEAD-N and TEAD-S will be discussed in this section and are presented in Tables 9 and 10, respectively.

Pursuant to the SDWA amendments of 1986, EPA has promulgated MCLs for fluoride (51 FR 11396, April 2, 1986); benzene, carbon tetrachloride, 1,4-dichlorobenzene, and trichloroethylene (52 FR 25690, July 8, 1987); cadmium, chromium, nitrate, nitrite, selenium, and tetrachloroethylene (56 FR 3526, January 30, 1991; effective July 30, 1992); pentachlorophenol (56 FR 30266, July 1, 1991; effective January 1, 1993); and antimony, benzo[*a*]pyrene, beryllium, bis(2-ethylhexyl)phthalate, dichloromethane, nickel, thallium, (see Tables 9 and 10). A National Interim Primary Drinking Water Regulation (NIPDWR) has been established for arsenic (40 FR 59570, December 24, 1975) (see Tables 9 and 10). NIPDWR were established for gross alpha and gross beta radioactivity (41 FR 28404, July 9, 1976). These interim values were changed to proposed status in July 1991 (56 FR 33050, July 18, 1991) with a final rule expected in April 1993. These values will be considered relevant and appropriate for cleanup of these chemicals in groundwater.

The State of Utah, under UAC R309-103, as revised July 1, 1991, has promulgated "Water Quality MCLs" for public water systems. The majority of Utah's primary drinking water standards under UAC R309-103-1 for the COCs at TEAD-N and TEAD-S are the same as or no more stringent than the federal SDWA MCLs; however, the state standards for two chemicals of concern, chromium and selenium, are stricter (see Tables 9 and 10). The state is requesting an extension from EPA to amend its regulations for these EPA Phase II contaminants by relaxing the standards in order to align itself with the federal rules (Bousfield 1992). Utah has a primary MCL for lead of 50 µg/L; however, the Utah Department of Environmental Quality plans to propose a maximum contaminant "action" level for lead in the fall of 1992 that will be consistent with the federal action level (see Section 2.2.1.), which becomes effective on December 7, 1992 (Blake 1992). In addition, Utah has promulgated primary drinking water standards for silver and sulfate, which only have secondary MCLs in effect under the SDWA (see Tables 9 and 10). Under UAC R309-103-1.1.d, Utah has set an MCL of 500 to 1,000 mg/L for sulfate with certain qualifications. If the sulfate level of a public water system (community, noncommunity or nontransient, noncommunity) is above 500 mg/L, the water supplier "must satisfactorily demonstrate that: a) no better water quality is available and b) the water shall not be available for human consumption from commercial establishments". The state also plans on adopting the proposed federal SDWA MCL for sulfates when it is promulgated. In the interim; however, the Utah standards for chromium, selenium, silver, and sulfate would be relevant and appropriate for cleanup of contaminated groundwater at TEAD-N and TEAD-S.

Secondary MCLs (SMCLs) have also been established under the SDWA for chloride and zinc (44 FR 42198, July 19, 1979); however, National Secondary Drinking Water Standards regulate the aesthetic qualities related to public acceptance of drinking water. These standards are not federally enforceable, but rather are intended to serve as guidelines for use by states in regulating water supplies. Utah has promulgated SMCLs for these chemicals in UAC R309-103, revised July 1, 1991 that are identical to the federal values (see Tables 9 and 10). These state secondary standards are intended as recommended levels.

TABLE 9. CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR CLEANUP OF GROUNDWATER AT TEAD-N (µg/L)[a]

Chemical	SDWA[b] MCL/MCLG[c]	Proposed SDWA MCL/MGCL	Utah MCLs[d]	TBC Value[e]
Metals				
Arsenic	50[f]	-	50	-
Chromium	100/100[g]	-	50	-
Lead	-	-	50	15/0[h]
Nickel	100/100[i]	-	-	-
Thallium	2/0.5[i]	-	-	-
Zinc	5,000[j]	-	5,000[j]	2,100[k]
Organics				
Benzene	5/0[l]	-	5	-
Bis(2-ethylhexyl)-phthalate	6/0[l]	-	-	-
Trichloroethylene	5/0[l]	-	5	-
Anions				
Chloride	250,000[j]	-	250,000[j]	-
Nitrite/Nitrate	10,000/ 10,000[g]	-	-	-
Sulfate	250,000[j]	400,000/ 500,000[m]	500,000-1,000,000	-
Nitroaromatics				
2,4-Dinitrotoluene	-	-	-	0.05[n]
HMX	-	-	-	400[k]
RDX	-	-	-	2[k]
1,3,5-Trinitrobenzene	-	-	-	2[o]
2,4,6-Trinitrotoluene	-	-	-	2[k]

TABLE 9 (Cont.)

[a]The underlined values indicate the ARAR or TBC for each chemical.
[b]SDWA = Safe Drinking Water Act.
[c]MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal.
[d]Utah Administrative Code R309-103, effective July 1, 1991.
[e]TBC = to be considered guidance.
[f]40 FR 59570 (December 24, 1975).
[g]56 FR 3526 (January 30, 1991); effective July 30, 1992.
[h]Established as an action level/MCLG, 56 FR 26460 (June 7, 1991) effective December 7, 1992.
[i]57 FR 31776 (July 17, 1992), effective January 17, 1994.
[j]National secondary drinking water standard; designed to protect the aesthetic quality of water (44 FR 42198, July 19, 1979), also Utah Secondary Maximum Contaminant Levels.
[k]USEPA Office of Drinking Water lifetime health advisory.
[l]52 FR 25690 (July 8, 1987).
[m]55 FR 30370 (July 25, 1990).
[n]Estimated from a carcinogen slope factor for a risk of 10^{-6}. The concentration in drinking water that will result in one excess cancer death in 1×10^{6} people following a lifetime exposure to contaminated drinking water.
[o]Estimated from a reference dose. The concentration in drinking water that is assumed to result in no adverse health effects following daily ingestion for a lifetime.

TABLE 10. CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR CLEANUP OF GROUNDWATER AT TEAD-S (µg/L)[a]

Chemical	SDWA[b] MCL/MCLG[c]	Proposed SDWA MCL/MGCL	Utah MCLs[d]	TBC Value[e]
Metals				
Antimony	6/6[f]	–	–	–
Arsenic	50[g]	–	50	–
Beryllium	4/4[f]	–	–	–
Cadmium	5/5[h]	–	10	
Chromium	100/100[h]	–	50	–
Lead	–	–	50	15/0[i]
Nickel	100/100[f]	–	–	–
Selenium	50/50[h]	–	10	–
Silver	100[j]	–	50	–
Thallium	2/0.5[f]	–	–	–
Zinc	5,000[j]	–	5,000[j]	2,100[k]
Volatile Organic Compounds				
Benzene	5/0[l]	–	5	–
Bromodichloromethane	–	–	–	0.27[m]
Carbon tetrachloride	5/0[l]	–	5	–
Chloroform	–	–	–	5.7[m]
2–Chlorophenol	–	–	–	40[k]
1,4–Dichlorobenzene	75/75[l]	–	75	–
Dichloromethane	5/0[f]	–	–	–
N–Nitrosodiphenylamine	–	–	–	7.1[m]
Nitroso–di–*N*–propyl–amine	–	–	–	0.005[m]
Pentachlorophenol	1/0[n]	–	–	–
Phenol	–	–	–	4,000[k]
Tetrachloroethylene	5/0[h]	–	–	–
Trichloroethylene	5/0[l]	–	5	–

Table 10. (Cont.)

Chemical	SDWA[b] MCL/MCLG[c]	Proposed SDWA MCL/MGCL	Utah MCLs[d]	TBC Value[e]
Anions				
Fluoride	4,000/ 4,000[e]	–	4,000	–
Nitrite	1,000/ 1,000[h]	–	–	–
Nitrate	10,000/ 10,000[h]	–	10,000	–
Sulfate	250,000[j]	400,000/ 500,000[p]	500,000– 1,000,000	–
Nitroaromatics				
1,3-Dinitrobenzene	–	–	–	1.0[k]
2,4-Dinitrotoluene	–	–	–	0.05[m]
2,6-Dinitrotoluene	–	–	–	0.05[m]
HMX	–	–	–	400[k]
Nitrobenzene	–	–	–	17.5[q]
RDX	–	–	–	2[k]
Tetryl	–	–	–	350[q]
1,3,5–Trinitrobenzene	–	–	–	2[q]
2,4,6-Trinitrotoluene	–	–	–	2[k]
Polynuclear Aromatic Hydrocarbons				
Naphthalene	–	–	–	20[k]
Phthalates				
Bis(2-ethylhexyl)-phthalate	6/0[f]	–	–	–
Agent Breakdown				
Isopropylmethyl phosphonic acid	–	–	–	700[k]
Radionuclides				
Gross alpha	15 pCi/L[r]	15 pCi/L[r]	15 pCi/L	–

Table 10. (Cont.)

Chemical	SDWA[b] MCL/MCLG[c]	Proposed SDWA MCL/MGCL	Utah MCLs[d]	TBC Value[e]
Gross beta	4 mrem /yr[f]	4 mrem/yr[r]	4 mrem/yr	-
Uranium	-	20[r]	-	-

[a]The underlined values indicate the ARAR or TBC for each chemical.
[b]SDWA = Safe Drinking Water Act.
[c]MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal.
[d]Utah Administrative Code R309-103, effective July 1, 1991.
[e]TBC = to be considered guidance.
[f]57 FR 31776 (July 17, 1992), effective January 17, 1992.
[g]40 FR 59570 (December 24, 1975).
[h]56 FR 3526 (January 30, 1991); effective July 30, 1992.
[i]Established as an action level/MCLG, 56 FR 26460 (June 7, 1991) effective December 7, 1992.
[j]National secondary drinking water standard; designed to protect the aesthetic quality of water (44 FR 42198, July 19, 1979), also Utah Secondary Maximum Contaminant Levels.
[k]USEPA Office of Drinking Water lifetime health advisory.
[l]52 FR 25690 (July 8, 1987).
[m]Estimated from a carcinogen slope factor for a risk of 10^{-6}. The concentration in drinking water that will result in one excess cancer death in 1×10^{6} people following a lifetime exposure to contaminated drinking water.
[n]56 FR 30266 (July 1, 1991), effective January 1, 1993.
[o]MCL - 51 FR 11396 (April 2, 1986); applies to community water systems; MCLG - 50 FR 47141 (November 14, 1985).
[p]55 FR 30370 (July 25, 1990).
[q]Estimated from a reference dose. The concentration in drinking water that is assumed to result in no adverse health effects following daily ingestion for a lifetime.
[r]41 FR 28404 (July 9, 1976). These interim values were changed to proposed status in July 1991 (56 FR 33050, July 18, 1991); final rule expected April 1993.

Pursuant to the SDWA amendments of 1986, EPA has proposed MCLs and MCLGs for for sulfate (55 FR 30370, July 25, 1990) and for uranium (56 FR 33050, July 18, 1991; final rule expected April 1993) (see Tables 9 and 10). The proposed federal MCL for sulfates is more stringent than the current state MCL. The EPA Regulatory Agenda states that an MCL for arsenic will be proposed in November 1992 (56 FR 18014, April 22, 1991). When the proposed MCLs are promulgated, they will be considered relevant and appropriate for cleanup of these chemicals in groundwater at TEAD-N and TEAD-S.

Utah has promulgated classifications for groundwater sources within the state based on ambient aquifer water quality (UAC R448-6-4, effective 1989). These regulations are applicable to "[a]ny person who [...] operates a facility that discharges or would probably discharge to ground water" (UAC R448-6-4.1.C). Currently groundwater sources at TEAD-N and TEAD-S have yet to be classified by the state. Thus, the state will make a site-specific classification from information provided by the Army on concentrations of total dissolved solids and contaminants (Barnes 1991). When such a classification is made for the groundwater at TEAD, the protection levels set in UAC R448-6-4 would be applicable for cleanup of contaminated groundwater at TEAD-N and TEAD-S. Based solely on data provided in Figure 3-2 of the Tooele Army Depot Preliminary Assessment/Site Investigation Final Report, it appears that the groundwater underlying TEAD-S will be designated Class II (Barnes 1991; EESTI 1988). Class II groundwater is to be protected for use as drinking water or other similar beneficial uses following conventional treatment prior to use (UAC R448-6-4.5.A). State regulations set Class II protection levels for total dissolved solids and for contaminants based on background concentrations. The following protection levels apply to Class II groundwater:

> "1. Total dissolved solids may not increase above 1.25 times the background value.
> 2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed 0.25 times the groundwater quality standard, or exceed the limit of detection, whichever is greater.
> 3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed 1.25 times the background concentration or exceed 0.25 times the groundwater quality standard, whichever is greater.
> 4. In no case will the concentration of a pollutant be allowed to exceed the groundwater quality standard."

These state Groundwater Standards listed in Table 1 of UAC R448-6-2 (effective 1989) and the proposed standards (UAC R448-6-2, August 23, 1991; effective late 1992) are identical to the federal or state MCLs. However, upon classification of TEAD groundwater, they would be applicable for cleanup of groundwater at TEAD; whereas, the MCLs would be relevant and appropriate.

2.1.2.2. Soil

There are no set maximum allowable residual levels for chemicals in soils under federal or state law. Each contaminated site is judged on an individual basis by the state with reference to background levels for the COCs (provided as available in Section 2.2.2.) as well as other criteria as determined by the state in order to set soil cleanup levels (Thiriot 1991).

RCRA has addressed land disposal of treated hazardous wastes in its land disposal restrictions (40 CFR 268). For each hazardous waste, EPA has established treatment standards that are protective of human health and the environment when the wastes are land disposed. Land disposal includes placement in a landfill, surface impoundment, waste pile, or land treatment facility. Wastes may be land disposed if they have been treated with the best demonstrated available technology (BDAT) set by EPA and meet the treatment standards. However, EPA has determined that the RCRA treatment standards are generally inappropriate or infeasible when applied to contaminated soil or debris (55 FR 8760). Therefore, EPA is proposing separate rulemakings to establish treatment standards for disposal of such contaminated soil and debris. The Advanced Notice of Proposed Rulemaking (ANPRM) for debris appeared in 56 FR 24444, May 30, 1991; the Notice of Proposed Rulemaking (NPRM) appeared January 9, 1992 (57 FR 958); with a final rule published on August 18, 1992 (57 FR 37194, effective November 16, 1992). The ANPRM for soil appeared in 56 FR 55160, October 24, 1991; the NPRM is expected in September 1992; with a final rulemaking in May 1993. These will be analyzed as ARARs or TBC when available. In the interim, EPA has developed guidance for obtaining and complying with a treatability variance for soil and debris that are contaminated with RCRA hazardous wastes for which treatment standards have already been set (OSWER Directive 9347.3-06FS, July 1989). Alternate treatment levels are presented for structural functional groups of organics and for ten inorganics based on actual treatment of soil and best management practices for debris. These will be considered as TBC guidance when remedial alternatives are selected and more information becomes available on waste types.

In the final NCP, EPA reaffirms that movement of waste within a unit does not constitute "land disposal" for purposes of application of the RCRA land disposal restrictions; however, waste consolidation from different units at a CERCLA site is subject to the restrictions (55 FR 8759). Determination of the applicability of the LDRs will depend on the selection of remedial alternatives at TEAD-N and TEAD-S.

2.2. OTHER GUIDANCE TO BE CONSIDERED

2.2.1. Groundwater

Lead. The EPA has set an action level of 15 µg/L for lead (in no more than 10% of tap water samples) that would provide TBC guidance for cleanup of groundwater at TEAD-N and TEAD-S. Exceedance of the action level indicates potential source water (groundwater) contamination and triggers the need to implement either optimal corrosion control for systems serving <50,000 people or source water monitoring and possible treatment, public education, and lead service line replacement for all systems. It is not equivalent to an MCL but is a treatment technique requirement. Upon exceedance, the water system is required to collect source water samples and submit the results to the state of Utah. Within six months of exceeding the lead action level, the water system is required to recommend in writing to the state a proposed source water treatment. The state of Utah would then be required to analyze the monitoring results and treatment recommendation to determine the technology that would be most effective at reducing contaminant levels in water delivered to the user's tap. Follow-up source water and tap samples are to be taken within 12 months of the installation of the treatment and submitted to the state. The state will then establish maximum permissible lead levels in source water that the water system must maintain. It is assumed that remediation to these maximum permissible lead levels would be required.

In the absence of federal- or state-promulgated ARARs, or in the case where ARARs are not adequately protective, EPA states a preference for Office of Drinking Water (ODW) Health Advisories (HAs) and RfDs for systemic toxicants and SFs for carcinogens (USEPA 1988; 53 FR 51394, December 21, 1988). RfDs and SFs are available from the EPA IRIS database (USEPA 1992a) and/or the EPA Health Effects Assessment Summary Tables (HEAST) (USEPA 1992b).

2-Chlorophenol; 1,3-Dinitrobenzene; HMX; Isopropylmethyl phosphonic acid; Naphthalene; Phenol; RDX; 2,4,6-Trinitrotoluene; Zinc. EPA has set lifetime drinking water HAs of 40; 1; 400; 700; 20; 4,000; 2; 2; and 2,100 for 2-chlorophenol, 1,3-dinitrobenzene; HMX; Isopropylmethyl phosphonic acid; naphthalene; phenol; RDX; 2,4,6-trinitrotoluene; and zinc, respectively (see Tables 9 and 10) (USEPA 1992c). These values are calculated assuming that an individual receives 80% of his exposure from sources other than consumption of drinking water. If a risk assessment at TEAD-N or TEAD-S indicates that 100% of a person's exposure to these chemicals would come from drinking water sources, corrected values would be 5 times these given values.

Estimates of acceptable concentrations in drinking water for the remaining chemicals of concern (see Tables 9 and 10) were derived using RfDs and SFs from IRIS (USEPA 1992a) or HEAST (USEPA 1992b) as follows:

Bromodichloromethane. EPA has classified this chemical as a Group B2 carcinogen. Using the equation given below and an oral carcinogen potency factor of 0.13 $(mg/kg/day)^{-1}$ (USEPA 1992a), a concentration of 0.27 µg/L in groundwater may be calculated that would result in one excess cancer in 10^6 individuals.

$$C_w = \frac{(70) \times (1 \times 10^{-6})}{q_1^* \times 2}$$

where

C_w	=	Concentration in water only, calculated to keep the lifetime risk below 10^{-6} following ingestion of drinking water alone;
70	=	Assumed body weight of an adult, kg;
1×10^{-6}	=	Selected risk level;
q_1^*	=	Carcinogenic slope factor for humans $(mg/kg/day)^{-1}$; and
2	=	Assumed daily water ingestion rate of an adult, L/day.

Chloroform. EPA has classified this chemical as a Group B2 carcinogen. Using the above equation and an oral carcinogen potency factor of 0.0061 $(mg/kg/day)^{-1}$ (USEPA 1992a), a concentration of 5.7 µg/L in groundwater may be calculated that would result in one excess cancer in 10^6 individuals.

2,4- and 2,6-Dinitrotoluene. EPA has recently issued a SF for both dinitrotoluene isomers, based on a study using technical grade DNT. EPA has classified both isomers as Group B2 carcinogens. Using the above equation and the SF of 0.68 $(mg/kg/day)^{-1}$ (USEPA 1992b), a

concentration in groundwater of 0.05 µg/L may be calculated that would result in one excess cancer in 10^{-6} individuals consuming 2 L of water per day.

N-Nitrosodiphenylamine. EPA has classified this chemical as a Group B2 carcinogen. Using the above equation and an oral carcinogen potency factor of 0.0049 $(mg/kg/day)^{-1}$ (USEPA 1992a), a concentration of 7.1 µg/L in groundwater may be calculated that would result in one excess cancer in 10^{6} individuals.

Nitroso-di-*N*-propylamine. EPA has classified this chemical as a Group B2 carcinogen. Using the above equation and an oral carcinogen potency factor of 7.0 $(mg/kg/day)^{-1}$ (USEPA 1992a), a concentration of 0.005 µg/L in groundwater may be calculated that would result in one excess cancer in 10^{6} individuals.

Nitrobenzene. The guidance value is derived using the equation given below from an oral reference dose of 5.0E-04 mg/kg/day (USEPA 1992a). An acceptable concentration (C_w) in drinking water of 17.5 µg/L is calculated. The RfD for nitrobenzene is still available on IRIS, but is currently under review by the RfD workgroup (USEPA 1992a).

$$C_w = \frac{RfD \times 70}{2}$$

where

C_w	=	Concentration in water that will result in no adverse health effects following ingestion of contaminated drinking water alone, in µg/L;
RfD	=	Reference dose, in mg/kg/day;
70	=	Assumed body weight of an adult, kg; and
2	=	Assumed daily water ingestion rate of an adult, L/day.

Tetryl (Trinitrophenylmethylnitramine). The guidance value is derived as above from an oral RfD of 0.01 mg/kg/day (USEPA 1992a). An acceptable concentration (C_w) in drinking water of 350 µg/L is calculated.

1,3,5-Trinitrobenzene. The guidance value is derived as above from an oral RfD of 0.05 µg/kg/day (USEPA 1992a). An acceptable concentration (C_w) in drinking water of 2 µg/L is calculated. The RfD is calculated using data obtained from studies with 1,3-dinitrobenzene.

2.2.2. Soil

Lead. EPA has recommended cleanup values for lead in soils based on studies of blood lead levels in exposed children. The EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.02 suggests a cleanup level for soils of 500-1000 ppm lead. In addition, for assessing the risk from exposure to lead in the soils at TEAD-N and TEAD-S, EPA's Uptake/Biokinetic Model can be used, upon approval of the EPA Regional Project Manager (RPM). The model provides a multimedia exposure approach to estimate the percentage (may vary from region to region) of the exposed population (children, ages 0-6) with blood lead levels above a critical value of 10 µg/dL.

Polynuclear aromatic hydrocarbons (PAHs). As an interim guidance, EPA Region IV has adopted a toxicity equivalency factor (TEF) approach for carcinogenic PAHs based on each compounds' relative potency to the potency of benzo[*a*]pyrene. Upon approval of the RPM for TEAD-N, the following TEFs could be used to convert the concentration of each PAH to an equivalent concentration of benzo[*a*]pyrene: 0.01 for chrysene; 0.1 for benzo[*a*]anthracene and benzo[*b*]fluoranthene; and 1.0 for and benzo[*a*]pyrene (USEPA 1992d). The oral carcinogen SF for benzo[*a*]pyrene is given in Table 13.

Total petroleum hydrocarbons (TPHCs). Unfortunately, no ARARs or TBC values are available to determine cleanup levels for TPHCs in soils.

In the proposed RCRA Hazardous Waste Identification Rule (57 FR 21510, May 20, 1992; final rule expected April 1993), EPA has proposed two approaches for determining if listed waste and contaminated media are subject to the hazardous waste management requirements under subtitle C of RCRA. The first approach establishes concentration-based-exemption criteria (CBEC) for listed hazardous wastes, wastes mixtures, derivatives, and media (including soils and groundwater) that are contaminated with certain RCRA wastes. The second approach established "characteristic" levels for the listed wastes in leachates as is performed under the current Toxicity Characteristics rule for an expanded number of toxic constituents (ECHO - Expanded Characteristics Option). Both criteria are human health risk-based levels. The proposed rule states that (57 FR 21498) EPA believes that CBEC/ECHO can be used as preliminary remediation goals (ARARs) for RCRA-listed wastes at CERCLA sites. The proposed CBEC/ECHO values are provided as potential TBC guidance for cleanup of COCs in soils at TEAD-N (Table 11) and at TEAD-S (Table 12). Site background levels where available for the COCs at each site have also been provided in these tables for comparison and also as potential TBC. There is currently significant discontent among state regulators concerning these approaches. However, if and when these values are promulgated, they could be applicable for cleanup of RCRA-listed contaminants at these sites and possibly relevant and appropriate for other COCs in contaminated soils at the sites.

In lieu of using any of the criteria presented in this report, cleanup levels for the COCs in contaminated soils at TEAD-N and TEAD-S may be determined by the USATHAMA contractor performing the RI using a site-specific risk assessment approach and the appropriate RfDs or SFs given in Table 13 for TEAD-N and in Table 14 for TEAD-S. The methodology outlined in RAGS (USEPA 1989) or the Preliminary Pollutant Limit Value (PPLV) methodology of Rosenblatt and Small (1981) may be utilized to quantitate exposure pathways and risk to individuals from exposure via the pathways of concern at a particular site. EPA Region IV has also provided the following interim guidance to be used in determining the risks associated with dermal exposure to contaminated soils: a) dermal absorption factors of 1.0% for organics and 0.1% for inorganics; and b) soil to skin adherence factors ranging from 0.2 to 1.0 mg/cm^2 (these factors differ from RAGS, based on new data (USEPA 1992d). Again, approval of the RPM for TEAD-N and TEAD-S must be obtained for using these factors in the risk calculations.

2.3 ACTION-SPECIFIC ARARs

When remedial alternatives have been selected for TEAD-N and TEAD-S, action-specific ARARs will be analyzed and provided under separate cover.

TABLE 11. POTENTIAL TBC GUIDANCE LEVELS FOR CLEANUP OF CONTAMINATED SOILS AT TEAD-N

Chemical	RCRA CBEC mg/kg[a]	RCRA ECHO mg/L[b]	Site Background µg/g[c]
Metals			
Beryllium	0.3	0.1	ND[d]
Chromium	400	10	30
Lead	500	1.5	15
Nickel	1,000	10	7
Zinc	1,000	700	40
Nitroaromatics			
2,4-Dinitrotoluene	0.2 (0.7)	0.05	NA[e]
2,6-Dinitrotoluene	0.2 (0.7)	0.05	NA
HMX	NA	NA	NA
RDX	NA	NA	NA
1,3,5-Trinitrobenzene	4	0.2	NA
2,4,6-Trinitrotoluene	NA	NA	NA
PAHs (carcinogenic)			
Benzo[a]anthracene	0.05	0.01	NA
Benzo[a]pyrene	0.2	0.02	NA
Benzo[b]fluoranthene	0.1	0.02	NA
Chrysene	10	0.02	NA

[a]Values in this column are Tier 1 CBEC (concentration-based exemption criteria) for soils proposed in the RCRA hazardous waste identification rule (57 *FR* 21510, May 20, 1992; final rule expected April 1993). Values in parentheses in this column are Exemption Quantitation Criteria (EQC). When a CBEC is below the EQC, the exemption demonstration must achieve an actual detection limit that is at least as low as the specified EQC.

[b]Values in this column are the maximum contaminant concentrations for the Toxicity Characteristics (ECHO -Expanded Characteristics Option) for leachates proposed in the RCRA hazardous waste identification rule (57 *FR* 21510, May 20, 1992; final rule expected April 1993).

[c]Concentrations of inorganics in soils in Tooele County; from Boerngen, J.G. and Shacklette, H.T., 1981.

[d]ND = Not detectable

[e]NA = Not available

TABLE 12. POTENTIAL TBC GUIDANCE LEVELS FOR CLEANUP OF CONTAMINATED SOILS AT TEAD-S

Chemical	RCRA CBEC mg/kg[a]	RCRA ECHO mg/L[b]	Site Background µg/g[c]
Metals			
Arsenic	20	5	12-39
Barium	1,000	200	NA[d]
Beryllium	0.3	0.1	0.23-0.38
Cadmium	40	0.5	<1.2-21
Chromium	400	10	17-56
Copper	NA	NA	11-58
Lead	500	1.5	9.4-250
Mercury	20	0.2	<0.03-0.32
Nickel	1,000	10	<2.7
Silver	400	20	0.09-1.8
Zinc	1,000	700	46-230
Nitroaromatics			
1,3-Dinitrobenzene	8	0.4	NA
2,4-Dinitrotoluene	0.2 (0.7)	0.05	NA
2,6-Dinitrotoluene	0.2 (0.7)	0.05	NA
HMX	NA	NA	NA
RDX	NA	NA	NA
Tetryl	NA	NA	NA
1,3,5-Trinitrobenzene	4	0.2	NA
2,4,6-Trinitrotoluene	NA	NA	NA
VOCs			
Benzene	40	0.5	NA
Nitroso-di-N-propylamine	0.2 (0.7)	0.01	NA
Trichloroethylene	100	0.5	NA
Total Petroleum Hydrocarbons	NA	NA	NA

TABLE 12. Cont.

Chemical	RCRA CBEC mg/kg[a]	RCRA ECHO mg/L[b]	Site Background µg/g[c]
DDD	5	0.1	NA
Pesticides			
DDD	5	0.1	NA

[a]Values in this column are Tier 1 CBEC (concentration-based exemption criteria) for soils proposed in the RCRA hazardous waste identification rule (57 *FR* 21510, May 20, 1992; final rule expected April 1993). Values in parentheses in this column are Exemption Quantitation Criteria (EQC). When a CBEC is below the EQC, the exemption demonstration must achieve an actual detection limit that is at least as low as the specified EQC.

[b]Values in this column are the maximum contaminant concentrations for the Toxicity Characteristics (ECHO -Expanded Characteristics Option) for leachates proposed in the RCRA hazardous waste identification rule (57 *FR* 21510, May 20, 1992; final rule expected April 1993).

[c]Background metal concentrations in soil (Ebasco 1992).

[d]NA = Not available

TABLE 13. REFERENCE DOSES (RFD), REFERENCE CONCENTRATIONS, AND CARCINOGEN SLOPE FACTORS (SF) FOR CHEMICALS DETECTED IN SOILS AT TEAD-N

Chemical	Oral RfD[a] (mg/kg/day)	Inhalation RfC[b] (mg/m^3)	Oral SF[c] $(mg/kg/day)^{-1}$	Inhalation SF $(mg/kg/day)^{-1}$	Weight-of-Evidence Class
Metals					
Beryllium	5.0E-03[d,e]	—	4.3E+00[e]	8.40E+00[f]	B2
Chromium (VI)	5.0E-03[e]	—	ND[g]	4.10E+01[f]	A
Lead	—	—	—	—	—
Nickel	2.0E-02[e]	—	ND	—	ND
Zinc	2.0E-01[f]	—	—	—	D
Nitroaromatics					
2,4-Dinitrotoluene	—	—	6.8E-01[f]	—	B2
2,6-Dinitrotoluene	—	—	6.8E-01[f]	—	B2
HMX	5.0E-02[e]	—	—	—	D
RDX	3.0E-03[e]	—	1.1E-01[e]	—	C
1,3,5-Trinitrobenzene	5.0E-05[e]	—	—	—	—
2,4,6-Trinitrotoluene	5.0E-04[e]	—	3.0E-02[e]	—	C
PAHs (carcinogenic)					
Benzo[a]anthracene	—	—	ND	—	B2
Benzo[a]pyrene	—	—	5.79E+00[e]	6.1E+00[f]	B2
Benzo[b]fluoranthene	—	—	ND	—	B2
Chrysene	—	—	ND	—	B2

[a] RfD = Chronic Reference Dose.
[b] RfC = Chronic Reference Concentration.
[c] SF = Carcinogen Slope Factor.
[d] Read as 5.0 times 10^{-3}.
[e] From IRIS (USEPA 1992a).
[f] From HEAST (USEPA 1992b).
[g] ND = Not determined.

TABLE 14. REFERENCE DOSES (RFD), REFERENCE CONCENTRATIONS, AND CARCINOGEN SLOPE FACTORS (SF) FOR CHEMICALS DETECTED IN SOIL AT TEAD-S

Chemical	Oral RfD[a] (mg/kg/day)	Inhalation RfC[b] (mg/m^3)	Oral SF[c] $(mg/kg/day)^{-1}$	Inhalation SF $(mg/kg/day)^{-1}$	Weight-of-Evidence Class
Metals					
Arsenic	3.0E-04[d,e]	—	—	5.0E+01[f]	A
Barium	7.0E-02[e]	5.0E-04[f]	—	—	—
Beryllium	5.0E-03[e]	—	4.3E+00[e]	8.40E+00[e]	B2
Cadmium	5.0E-04[e]	—	ND[g]	6.10E+00[f]	B1
Chromium (VI)	5.0E-03[e]	—	ND	4.10E+01[e]	A
Copper	—	—	—	—	—
Lead	—	—	—	—	—
Mercury	3.0E-04[f]	3.0E-04[f]	—	—	D
Nickel	2.0E-02[e]	—	ND	—	ND
Silver	5.0E-03[e]	—	—	—	D
Zinc	2.0E-01[f]	—	—	—	D
Nitroaromatics					
1,3-Dinitrobenzene	1.0E-04[e]	—	—	—	D
2,4-Dinitrotoluene	—	—	6.8E-01[f]	—	B2
2,6-Dinitrotoluene	—	—	6.8E-01[f]	—	B2
HMX	5.0E-02[e]	—	—	—	D
RDX	3.0E-03[e]	—	1.1E-01[e]	—	C
Tetryl	1.0E-02[f]	—	—	—	—
1,3,5-Trinitrobenzene	5.0E-05[e]	—	—	—	—
2,4,6-Trinitrotoluene	5.0E-04[e]	—	3.0E-02[e]	—	C
VOCs					
Benzene	—	—	2.9E-02[e]	2.9E-02[f]	A
Nitroso-di-N-propylamine	—	—	7.0E+00[e]	—	B2
Trichloroethylene	—	—	—	—	B2

TABLE 14. Cont.

Chemical	Oral RfD[a] (mg/kg/day)	Inhalation RfC[b] (mg/m^3)	Oral SF[c] $(mg/kg/day)^{-1}$	Inhalation SF $(mg/kg/day)^{-1}$	Weight-of-Evidence Class
Total Petroleum Hydrocarbons	—	—	—	—	—
Pesticides					
DDD	—	—	2.4E-01[e]	—	B2

[a] RfD = Chronic Reference Dose.
[b] RfC = Chronic Reference Concentration.
[c] SF = Carcinogen Slope Factor.
[d] Read as 3.0 times 10^{-4}.
[e] From IRIS (USEPA 1992a).
[f] From HEAST (USEPA 1992b).
[g] ND = Not determined.

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APPENDIX A

Indicator Chemical Worksheets

NORTH AREA

WORKSHEET W-1a SCORING FOR INDICATOR CHEMICAL SELECTION: CONCENTRATIONS IN WATER

CHEMNAME SITE: tdn	C/N/B	Ground Water (mg/l) Low	High	Repres.	Surface Water (mg/l) Low	High	Repres.
ANTIMONY (METALLIC)	N					0.0112	
ARSENIC, INORGANIC	B	0.0052	0.1100			0.0027	
BARIUM	N	0.0230	0.4880		0.0610	0.0610	
BENZALDEHYDE	N						
BENZENE	C	0.0008	0.0016				
BENZO(A)PYRENE	C		0.0000				
BENZYL ALCOHOL	N	0.0000	0.0080			0.0000	
BERYLLIUM	B	0.0002	0.0016			0.0005	
BIS(2-ETHYLHEXYL)PHTHALATE	B	0.0100	0.7900				
BUTYL BENZYL PHTHLATE	N						
CADMIUM	B					0.0060	
CHLOROFORM	B		0.0020				
CHROMIUM(III)	N	0.0050	0.0519		0.0050	0.0150	
CHROMIUM(VI)	B	0.0050	0.0519		0.0050	0.0150	
CYANIDE (CN-)	N				0.0100	0.0100	
DICHLOROETHYLENE, 1,2-T-	N		0.0112				
DINITROTOLUENE, 2,4-	C	0.0075	0.2000				
DINITROTOLUENE, 2,6-	C						
FLUORANTHENE	N						
FLUORIDE	N	1.0000	1.0000		1.0000	1.0000	
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	B	0.0010	0.2750		1.0000	1.0000	
MANGANESE	N						
MERCURY, INORGANIC	N		0.0002				
NICKEL (METALLIC)	N	0.0050	0.2940		0.0050	0.0200	
NITRATE	N	1.0000	1.0000		1.0000	1.0000	
NITRITE	N	0.5200	3050.0000			1.1800	
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAN	N	0.0122	0.0232				
OCTYL PHTHALATE, DI-N-	N						
PHENOL	N	0.0010	0.0030				
POLYCHLORINATED BIPHENYLS	C						
PYRENE	N						
SELENIUM	N	0.0062	0.0088				
SILVER	N	0.0002	0.0026			0.0002	
TETRACHLOROETHYLENE	N		0.0011				
THALLIUM (IN SOLUBLE SALTS)	*		0.0034				
TOLUENE	N	0.0020	0.0130				
TRICHLOROETHANE, 1,1,1-	N						
TRICHLOROETHYLENE	*	0.0011	0.0476				
TRINITROBENZENE, 1,3,5-	N		0.1000				
TRINITROPHENYLMETHYLNITRAMINE	N					0.0010	
TRINITROTOLUENE, 2,4,6-	B	0.0010	0.0374				
ZINC (METALLIC)	N	0.001	2.435		0.001	0.08	

WORKSHEET W-1b SCORING FOR INDICATOR CHEMICAL SELECTION: CONCENTRATIONS IN SOIL AND SEDIMENT

CHEMNAME SITE: tdn	C/N/B	Soil (mg/kg) Low	Soil (mg/kg) High	Soil (mg/kg) Repres.	Sediment (mg/kg) Low	Sediment (mg/kg) High	Sediment (mg/kg) Repres.
ANTIMONY (METALLIC)	N						
ARSENIC, INORGANIC	B	6.4790	25.8410			10.0000	
BARIUM	N					50.0000	
BENZALDEHYDE	N	0.1400	2.3000				
BENZENE	C	0.0000	0.0000				
BENZO(A)PYRENE	C	0.4400	0.6600				
BENZYL ALCOHOL	N	0.0000	0.0000			0.0000	
BERYLLIUM	B	0.2970	3.0000			0.0700	
BIS(2-ETHYLHEXYL)PHTHALATE	B	0.0700	4.8590				
BUTYL BENZYL PHTHLATE	N		0.5000				
CADMIUM	B	0.8210	7.2920				
CHLOROFORM	B						
CHROMIUM(III)	N	3.6050	217.7080			5.5000	
CHROMIUM(VI)	B	3.6050	217.7080			5.5000	
CYANIDE (CN-)	N						
DICHLOROETHYLENE, 1,2-T-	N						
DINITROTOLUENE, 2,4-	C	0.5100	80.0000				
DINITROTOLUENE, 2,6-	C		300.0000				
FLUORANTHENE	N	0.0900	0.6100				
FLUORIDE	N	1.3000	1000.0000				
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	B	1.6730	1000.0000				
MANGANESE	N						
MERCURY, INORGANIC	N		0.5570				
NICKEL (METALLIC)	N	5.0800	81.9240			5.1000	
NITRATE	N	3000.0000	4000.0000				
NITRITE	N	8.8100	1080.2900				
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAN	N	1.2760	95.2000				
OCTYL PHTHALATE, DI-N-	N	0.0400	0.1400				
PHENOL	N						
POLYCHLORINATED BIPHENYLS	C	0.0190	0.2170				
PYRENE	N	0.0800	5.4000				
SELENIUM	N		5.8150				
SILVER	N				0.0200	0.2000	
TETRACHLOROETHYLENE	N						
THALLIUM (IN SOLUBLE SALTS)	*					0.0850	
TOLUENE	N						
TRICHLOROETHANE, 1,1,1-	N		0.6350				
TRICHLOROETHYLENE	*						
TRINITROBENZENE, 1,3,5-	N	3.5080	90.0000				
TRINITROPHENYLMETHYLNITRAMINE	N						
TRINITROTOLUENE, 2,4,6-	B	2.2650	**********				
ZINC (METALLIC)	N	53.6	2072.002		16	16.2	

WORKSHEET W-2 SCORING FOR INDICATOR SELECTION: TOXICITY DATA

CHEMNAME SITE: tdn	TOX CLASS	WSS	AIR
ANTIMONY (METALLIC)	NC	4.00E-04	NA
ARSENIC, INORGANIC	PC	NA	5.00E+01
	NC	3.00E-04	NA
BARIUM	NC	7.00E-02	5.00E-04
BENZALDEHYDE	NC	1.00E-01	NA
BENZENE	PC	2.90E-02	2.90E-02
BENZO(A)PYRENE	PC	5.79E+00	6.10E+00
BENZYL ALCOHOL	NC	3.00E-01	NA
BERYLLIUM	PC	4.30E+00	8.40E+00
	NC	5.00E-03	NA
BIS(2-ETHYLHEXYL)PHTHALATE	PC	1.40E-02	NA
	NC	2.00E-02	NA
BUTYL BENZYL PHTHLATE	NC	2.00E-01	NA
CADMIUM	PC	NA	6.10E+00
	NC	5.00E-04	NA
CHLOROFORM	PC	6.10E-03	8.10E-02
	NC	1.00E-02	NA
CHROMIUM(III)	NC	1.00E+00	NA
CHROMIUM(VI)	PC	NA	4.10E+01
	NC	5.00E-03	NA
CYANIDE (CN-)	NC	2.00E-02	NA
DICHLOROETHYLENE, 1,2-T-	NC	2.00E-02	NA
DINITROTOLUENE, 2,4-	PC	6.80E-01	NA
DINITROTOLUENE, 2,6-	PC	6.80E-01	NA
FLUORANTHENE	NC	4.00E-02	NA
FLUORIDE	NC	6.00E-02	NA
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	PC	1.10E-01	NA
	NC	3.00E-03	NA
MANGANESE	NC	1.00E-01	4.00E-04
MERCURY, INORGANIC	NC	3.00E-04	3.00E-04
NICKEL (METALLIC)	NC	2.00E-02	NA
NITRATE	NC	1.60E+00	NA
NITRITE	NC	1.00E-01	NA
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,	NC	5.00E-02	NA
OCTYL PHTHALATE, DI-N-	NC	2.00E-02	NA
PHENOL	NC	6.00E-01	NA
POLYCHLORINATED BIPHENYLS	PC	7.70E+00	NA
PYRENE	NC	3.00E-02	NA
SELENIUM	NC	5.00E-03	NA
SILVER	NC	5.00E-03	NA
TETRACHLOROETHYLENE	NC	1.00E-02	NA
THALLIUM (IN SOLUBLE SALTS)	*		
TOLUENE	NC	2.00E-01	4.00E-01
TRICHLOROETHANE, 1,1,1-	NC	9.00E-02	1.00E+00
TRICHLOROETHYLENE	*		
TRINITROBENZENE, 1,3,5-	NC	5.00E-05	NA
TRINITROPHENYLMETHYLNITRAMINE	NC	1.00E-02	NA
TRINITROTOLUENE, 2,4,6-	PC	3.00E-02	NA
	NC	5.00E-04	NA
ZINC (METALLIC)	NC	2.00E-01	NA

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"**" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn		GND_H2O	RR
DINITROTOLUENE, 2,4-			1.36E-01	7.34E-01
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE			3.03E-02	1.63E-01
BIS(2-ETHYLHEXYL)PHTHALATE			1.11E-02	5.97E-02
BERYLLIUM			6.88E-03	3.71E-02
TRINITROTOLUENE, 2,4,6-			1.12E-03	6.05E-03
BENZENE			4.64E-05	2.50E-04
CHLOROFORM			1.22E-05	6.58E-05
DINITROTOLUENE, 2,6-		*	0.00E+00	0.00E+00
BENZO(A)PYRENE		*	0.00E+00	0.00E+00
POLYCHLORINATED BIPHENYLS		*	0.00E+00	0.00E+00
CADMIUM		*	NA	NA
CHROMIUM(VI)			NA	NA
ARSENIC, INORGANIC			NA	NA
TOTAL RISK FACTOR			1.85E-01	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn		SUR_H2O	RR
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		1.10E-01	9.81E-01
BERYLLIUM		2.15E-03	1.92E-02
CHLOROFORM	*	0.00E+00	0.00E+00
BENZO(A)PYRENE	*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE	*	0.00E+00	0.00E+00
POLYCHLORINATED BIPHENYLS	*	0.00E+00	0.00E+00
BENZENE	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,6-	*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,4-	*	0.00E+00	0.00E+00
CADMIUM		NA	NA
CHROMIUM(VI)		NA	NA
ARSENIC, INORGANIC		NA	NA
TOTAL RISK FACTOR		1.12E-01	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn		SOIL	RR
TRINITROTOLUENE, 2,4,6-		9.61E+04	9.96E-01
DINITROTOLUENE, 2,6-		2.04E+02	2.11E-03
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		1.10E+02	1.14E-03
DINITROTOLUENE, 2,4-		5.44E+01	5.64E-04
BERYLLIUM		1.29E+01	1.34E-04
BENZO(A)PYRENE		3.82E+00	3.96E-05
POLYCHLORINATED BIPHENYLS		1.67E+00	1.73E-05
BIS(2-ETHYLHEXYL)PHTHALATE		6.80E-02	7.05E-07
BENZENE	*	0.00E+00	0.00E+00
CHLOROFORM	*	0.00E+00	0.00E+00
CADMIUM		NA	NA
CHROMIUM(VI)		NA	NA
ARSENIC, INORGANIC		NA	NA
TOTAL RISK FACTOR		9.65E+04	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"**" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn		SEDIM	RR
BERYLLIUM		3.01E-01	1.00E+00
POLYCHLORINATED BIPHENYLS	*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE	*	0.00E+00	0.00E+00
BENZENE	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,4-	*	0.00E+00	0.00E+00
CHLOROFORM	*	0.00E+00	0.00E+00
BENZO(A)PYRENE	*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,6-	*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-	*	0.00E+00	0.00E+00
CADMIUM	*	NA	NA
CHROMIUM(VI)		NA	NA
ARSENIC, INORGANIC		NA	NA
TOTAL RISK FACTOR		3.01E-01	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn	GND_H2O	RR		SUR_H2O	RR		SOIL	RR		SEDIM	RR		AIR	RR
BERYLLIUM		6.88E-03	3.71E-02		2.15E-03	1.92E-02		1.29E+01	1.34E-04		3.01E-01	1.00E+00	*	0.00E+00	
POLYCHLORINATED BIPHENYLS	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00		1.67E+00	1.73E-05	*	0.00E+00	0.00E+00	*	NA	
BIS(2-ETHYLHEXYL)PHTHALAT		1.11E-02	5.97E-02	*	0.00E+00	0.00E+00		6.80E-02	7.05E-07	*	0.00E+00	0.00E+00	*	NA	
BENZENE		4.64E-05	2.50E-04	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	*	0.00E+00	
DINITROTOLUENE, 2,4-		1.36E-01	7.34E-01	*	0.00E+00	0.00E+00		5.44E+01	5.64E-04	*	0.00E+00	0.00E+00	*	NA	
CHLOROFORM		1.22E-05	6.58E-05	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	*	0.00E+00	
BENZO(A)PYRENE	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00		3.82E+00	3.96E-05	*	0.00E+00	0.00E+00	*	0.00E+00	
HEXAHYDRO-1,3,5-TRINITRO-		3.03E-02	1.63E-01		1.10E-01	9.81E-01		1.10E+02	1.14E-03	*	0.00E+00	0.00E+00	*	NA	
DINITROTOLUENE, 2,6-	*	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00		2.04E+02	2.11E-03	*	0.00E+00	0.00E+00	*	NA	
TRINITROTOLUENE, 2,4,6-		1.12E-03	6.05E-03	*	0.00E+00	0.00E+00		9.61E+04	9.96E-01	*	0.00E+00	0.00E+00	*	NA	
CADMIUM	*	NA	NA		NA	NA		NA	NA	*	NA	NA	*	0.00E+00	
CHROMIUM(VI)		NA	NA		NA	NA		NA	NA		NA	NA	*	0.00E+00	
ARSENIC, INORGANIC		NA	NA		NA	NA		NA	NA		NA	NA	*	0.00E+00	
TOTAL RISK FACTOR		1.85E-01	1.00E+00		1.12E-01	1.00E+00		9.65E+04	1.00E+00		3.01E-01	1.00E+00		0.00E+00	

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn	GND_H2O	RR
NITRITE		3.05E+04	9.20E-01
TRINITROBENZENE, 1,3,5-		2.00E+03	6.04E-02
ARSENIC, INORGANIC		3.67E+02	1.11E-02
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		9.17E+01	2.77E-03
TRINITROTOLUENE, 2,4,6-		7.48E+01	2.26E-03
BIS(2-ETHYLHEXYL)PHTHALATE		3.95E+01	1.19E-03
FLUORIDE		1.67E+01	5.03E-04
NICKEL (METALLIC)		1.47E+01	4.44E-04
ZINC (METALLIC)		1.22E+01	3.67E-04
CHROMIUM(VI)		1.04E+01	3.13E-04
BARIUM		6.97E+00	2.10E-04
SELENIUM		1.76E+00	5.31E-05
MERCURY, INORGANIC		6.67E-01	2.01E-05
NITRATE		6.25E-01	1.89E-05
DICHLOROETHYLENE, 1,2-T-		5.60E-01	1.69E-05
SILVER		5.20E-01	1.57E-05
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		4.64E-01	1.40E-05
BERYLLIUM		3.20E-01	9.66E-06
CHLOROFORM		2.00E-01	6.04E-06
TETRACHLOROETHYLENE		1.10E-01	3.32E-06
TOLUENE		6.50E-02	1.96E-06
CHROMIUM(III)		5.19E-02	1.57E-06
BENZYL ALCOHOL		2.67E-02	8.05E-07
PHENOL		5.00E-03	1.51E-07
TRICHLOROETHANE, 1,1,1-	*	0.00E+00	0.00E+00
TRINITROPHENYLMETHYLNITRAMINE	*	0.00E+00	0.00E+00
CADMIUM	*	0.00E+00	0.00E+00
BUTYL BENZYL PHTHLATE	*	0.00E+00	0.00E+00
PYRENE	*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-	*	0.00E+00	0.00E+00
BENZALDEHYDE	*	0.00E+00	0.00E+00
FLUORANTHENE	*	0.00E+00	0.00E+00
CYANIDE (CN-)	*	0.00E+00	0.00E+00
MANGANESE	*	0.00E+00	0.00E+00
ANTIMONY (METALLIC)	*	0.00E+00	0.00E+00
TOTAL RISK FACTOR		3.31E+04	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn		SUR_H2O	RR
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE			3.33E+02	7.98E-01
ANTIMONY (METALLIC)			2.80E+01	6.71E-02
FLUORIDE			1.67E+01	3.99E-02
CADMIUM			1.20E+01	2.87E-02
NITRITE			1.18E+01	2.83E-02
ARSENIC, INORGANIC			9.00E+00	2.16E-02
CHROMIUM(VI)			3.00E+00	7.19E-03
NICKEL (METALLIC)			1.00E+00	2.40E-03
BARIUM			8.71E-01	2.09E-03
NITRATE			6.25E-01	1.50E-03
CYANIDE (CN-)			5.00E-01	1.20E-03
ZINC (METALLIC)			4.00E-01	9.58E-04
BERYLLIUM			1.00E-01	2.40E-04
TRINITROPHENYLMETHYLNITRAMINE			1.00E-01	2.40E-04
SILVER			4.00E-02	9.58E-05
CHROMIUM(III)			1.50E-02	3.59E-05
TRICHLOROETHANE, 1,1,1-		*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE		*	0.00E+00	0.00E+00
SELENIUM		*	0.00E+00	0.00E+00
BUTYL BENZYL PHTHLATE		*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE		*	0.00E+00	0.00E+00
PYRENE		*	0.00E+00	0.00E+00
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-		*	0.00E+00	0.00E+00
PHENOL		*	0.00E+00	0.00E+00
BENZALDEHYDE		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-		*	0.00E+00	0.00E+00
FLUORANTHENE		*	0.00E+00	0.00E+00
TOLUENE		*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-		*	0.00E+00	0.00E+00
MERCURY, INORGANIC		*	0.00E+00	0.00E+00
BENZYL ALCOHOL		*	0.00E+00	0.00E+00
CHLOROFORM		*	0.00E+00	0.00E+00
MANGANESE		*	0.00E+00	0.00E+00
TRINITROBENZENE, 1,3,5-		*	0.00E+00	0.00E+00
TOTAL RISK FACTOR			4.17E+02	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn		SOIL	RR
TRINITROTOLUENE, 2,4,6-		6.41E+09	1.00E+00
TRINITROBENZENE, 1,3,5-		1.80E+06	2.81E-04
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		3.33E+05	5.20E-05
ARSENIC, INORGANIC		8.61E+04	1.34E-05
CHROMIUM(VI)		4.35E+04	6.80E-06
FLUORIDE		1.67E+04	2.60E-06
CADMIUM		1.46E+04	2.28E-06
NITRITE		1.08E+04	1.69E-06
ZINC (METALLIC)		1.04E+04	1.62E-06
NICKEL (METALLIC)		4.10E+03	6.39E-07
NITRATE		2.50E+03	3.90E-07
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		1.90E+03	2.97E-07
MERCURY, INORGANIC		1.86E+03	2.90E-07
SELENIUM		1.16E+03	1.82E-07
BERYLLIUM		6.00E+02	9.36E-08
BIS(2-ETHYLHEXYL)PHTHALATE		2.43E+02	3.79E-08
CHROMIUM(III)		2.18E+02	3.40E-08
PYRENE		1.80E+02	2.81E-08
BENZALDEHYDE		2.30E+01	3.59E-09
FLUORANTHENE		1.53E+01	2.38E-09
TRICHLOROETHANE, 1,1,1-		7.06E+00	1.10E-09
OCTYL PHTHALATE, DI-N-		7.00E+00	1.09E-09
BUTYL BENZYL PHTHLATE		2.50E+00	3.90E-10
CYANIDE (CN-)	*	0.00E+00	0.00E+00
TRINITROPHENYLMETHYLNITRAMINE	*	0.00E+00	0.00E+00
BARIUM	*	0.00E+00	0.00E+00
SILVER	*	0.00E+00	0.00E+00
BENZYL ALCOHOL	*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE	*	0.00E+00	0.00E+00
CHLOROFORM	*	0.00E+00	0.00E+00
PHENOL	*	0.00E+00	0.00E+00
TOLUENE	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-	*	0.00E+00	0.00E+00
MANGANESE	*	0.00E+00	0.00E+00
ANTIMONY (METALLIC)	*	0.00E+00	0.00E+00
TOTAL RISK FACTOR		6.41E+09	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn		SEDIM	RR
ARSENIC, INORGANIC			3.33E+04	9.38E-01
CHROMIUM(VI)			1.10E+03	3.09E-02
BARIUM			7.14E+02	2.01E-02
NICKEL (METALLIC)			2.55E+02	7.17E-03
ZINC (METALLIC)			8.10E+01	2.28E-03
SILVER			4.00E+01	1.13E-03
BERYLLIUM			1.40E+01	3.94E-04
CHROMIUM(III)			5.50E+00	1.55E-04
PYRENE		*	0.00E+00	0.00E+00
BUTYL BENZYL PHTHLATE		*	0.00E+00	0.00E+00
NITRITE		*	0.00E+00	0.00E+00
CYANIDE (CN-)		*	0.00E+00	0.00E+00
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		*	0.00E+00	0.00E+00
TRINITROPHENYLMETHYLNITRAMINE		*	0.00E+00	0.00E+00
SELENIUM		*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE		*	0.00E+00	0.00E+00
TRINITROBENZENE, 1,3,5-		*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-		*	0.00E+00	0.00E+00
BENZYL ALCOHOL		*	0.00E+00	0.00E+00
FLUORANTHENE		*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE		*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-		*	0.00E+00	0.00E+00
CHLOROFORM		*	0.00E+00	0.00E+00
MERCURY, INORGANIC		*	0.00E+00	0.00E+00
PHENOL		*	0.00E+00	0.00E+00
FLUORIDE		*	0.00E+00	0.00E+00
TOLUENE		*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,1-		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-		*	0.00E+00	0.00E+00
CADMIUM		*	0.00E+00	0.00E+00
NITRATE		*	0.00E+00	0.00E+00
BENZALDEHYDE		*	0.00E+00	0.00E+00
MANGANESE		*	0.00E+00	0.00E+00
ANTIMONY (METALLIC)		*	0.00E+00	0.00E+00
TOTAL RISK FACTOR			3.55E+04	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tdn	GND_H2O	RR	SUR_H2O	RR	SOIL	RR	SEDIM	RR	AIR	RR
ARSENIC, INORGANIC		3.67E+02	1.11E-02	9.00E+00	2.16E-02	8.61E+04	1.34E-05	3.33E+04	9.38E-01 *	NA	
CHROMIUM(VI)		1.04E+01	3.13E-04	3.00E+00	7.19E-03	4.35E+04	6.80E-06	1.10E+03	3.09E-02 *	NA	
BARIUM		6.97E+00	2.10E-04	8.71E-01	2.09E-03 *	0.00E+00	0.00E+00	7.14E+02	2.01E-02 *	0.00E+00	
NICKEL (METALLIC)		1.47E+01	4.44E-04	1.00E+00	2.40E-03	4.10E+03	6.39E-07	2.55E+02	7.17E-03 *	NA	
ZINC (METALLIC)		1.22E+01	3.67E-04	4.00E-01	9.58E-04	1.04E+04	1.62E-06	8.10E+01	2.28E-03 *	NA	
SILVER		5.20E-01	1.57E-05	4.00E-02	9.58E-05 *	0.00E+00	0.00E+00	4.00E+01	1.13E-03 *	NA	
BERYLLIUM		3.20E-01	9.66E-06	1.00E-01	2.40E-04	6.00E+02	9.36E-08	1.40E+01	3.94E-04 *	NA	
CHROMIUM(III)		5.19E-02	1.57E-06	1.50E-02	3.59E-05	2.18E+02	3.40E-08	5.50E+00	1.55E-04 *	NA	
PYRENE	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	1.80E+02	2.81E-08 *	0.00E+00	0.00E+00 *	NA	
BUTYL BENZYL PHTHLATE	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	2.50E+00	3.90E-10 *	0.00E+00	0.00E+00 *	NA	
NITRITE		3.05E+04	9.20E-01	1.18E+01	2.83E-02	1.08E+04	1.69E-06 *	0.00E+00	0.00E+00 *	NA	
CYANIDE (CN-)	*	0.00E+00	0.00E+00	5.00E-01	1.20E-03 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
OCTAHYDRO-1,3,5,7-TETRANI		4.64E-01	1.40E-05 *	0.00E+00	0.00E+00	1.90E+03	2.97E-07 *	0.00E+00	0.00E+00 *	NA	
TRINITROPHENYLMETHYLNITRA	*	0.00E+00	0.00E+00	1.00E-01	2.40E-04 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
SELENIUM		1.76E+00	5.31E-05 *	0.00E+00	0.00E+00	1.16E+03	1.82E-07 *	0.00E+00	0.00E+00 *	NA	
HEXAHYDRO-1,3,5-TRINITRO-		9.17E+01	2.77E-03	3.33E+02	7.98E-01	3.33E+05	5.20E-05 *	0.00E+00	0.00E+00 *	NA	
BIS(2-ETHYLHEXYL)PHTHALAT		3.95E+01	1.19E-03 *	0.00E+00	0.00E+00	2.43E+02	3.79E-08 *	0.00E+00	0.00E+00 *	NA	
TRINITROBENZENE, 1,3,5-		2.00E+03	6.04E-02 *	0.00E+00	0.00E+00	1.80E+06	2.81E-04 *	0.00E+00	0.00E+00 *	NA	
TRINITROTOLUENE, 2,4,6-		7.48E+01	2.26E-03 *	0.00E+00	0.00E+00	6.41E+09	1.00E+00 *	0.00E+00	0.00E+00 *	NA	
BENZYL ALCOHOL		2.67E-02	8.05E-07 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
FLUORANTHENE	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	1.53E+01	2.38E-09 *	0.00E+00	0.00E+00 *	NA	
TETRACHLOROETHYLENE		1.10E-01	3.32E-06 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
OCTYL PHTHALATE, DI-N-	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	7.00E+00	1.09E-09 *	0.00E+00	0.00E+00 *	NA	
CHLOROFORM		2.00E-01	6.04E-06 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
MERCURY, INORGANIC		6.67E-01	2.01E-05 *	0.00E+00	0.00E+00	1.86E+03	2.90E-07 *	0.00E+00	0.00E+00 *	0.00E+00	
PHENOL		5.00E-03	1.51E-07 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
FLUORIDE		1.67E+01	5.03E-04	1.67E+01	3.99E-02	1.67E+04	2.60E-06 *	0.00E+00	0.00E+00 *	NA	
TOLUENE		6.50E-02	1.96E-06 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	
TRICHLOROETHANE, 1,1,1-	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	7.06E+00	1.10E-09 *	0.00E+00	0.00E+00 *	0.00E+00	
DICHLOROETHYLENE, 1,2-T-		5.60E-01	1.69E-05 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
CADMIUM	*	0.00E+00	0.00E+00	1.20E+01	2.87E-02	1.46E+04	2.28E-06 *	0.00E+00	0.00E+00 *	NA	
NITRATE		6.25E-01	1.89E-05	6.25E-01	1.50E-03	2.50E+03	3.90E-07 *	0.00E+00	0.00E+00 *	NA	
BENZALDEHYDE	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00	2.30E+01	3.59E-09 *	0.00E+00	0.00E+00 *	NA	
MANGANESE	*	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	0.00E+00	
ANTIMONY (METALLIC)	*	0.00E+00	0.00E+00	2.80E+01	6.71E-02 *	0.00E+00	0.00E+00 *	0.00E+00	0.00E+00 *	NA	
TOTAL RISK FACTOR		3.31E+04	1.00E+00	4.17E+02	1.00E+00	6.41E+09	1.00E+00	3.55E+04	1.00E+00	0.00E+00	

WORKSHEET W-5 RANK & RELATIVE RISK by MEDIA - PC GROUP

"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn	GND_H2O RR	RANK		SUR_H2O RR	RANK		SOIL RR	RANK		SEDIM RR	RANK		AIR RR	RANK
ARSENIC, INORGANIC	NA	NA		NA	NA		NA	NA		NA	NA	*		
BENZENE	2.50E-04	6	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
BENZO(A)PYRENE	* 0.00E+00		*	0.00E+00			3.96E-05	6	*	0.00E+00		*		
BERYLLIUM	3.71E-02	4		1.92E-02	2		1.34E-04	5		1.00E+00	1	*		
BIS(2-ETHYLHEXYL)PHTHALATE	5.97E-02	3	*	0.00E+00			7.05E-07	8	*	0.00E+00		*		
CADMIUM	* NA	NA		NA	NA		NA	NA	*	NA	NA	*		
CHLOROFORM	6.58E-05	7	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CHROMIUM(VI)	NA	NA		NA	NA		NA	NA		NA	NA	*		
DINITROTOLUENE, 2,4-	7.34E-01	1	*	0.00E+00			5.64E-04	4	*	0.00E+00		*		
DINITROTOLUENE, 2,6-	* 0.00E+00		*	0.00E+00			2.11E-03	2	*	0.00E+00		*		
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	1.63E-01	2		9.81E-01	1		1.14E-03	3	*	0.00E+00		*		
POLYCHLORINATED BIPHENYLS	* 0.00E+00		*	0.00E+00			1.73E-05	7	*	0.00E+00		*		
TRINITROTOLUENE, 2,4,6-	6.05E-03	5	*	0.00E+00			9.96E-01	1	*	0.00E+00		*		

WORKSHEET W-6 RANK & RELATIVE RISK by MEDIA - NC GROUP

"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tdn	GND_H2O RR	RANK		SUR_H2O RR	RANK		SOIL RR	RANK		SEDIM RR	RANK		AIR RR	RANK
ANTIMONY (METALLIC)	* 0.00E+00			6.71E-02	2	*	0.00E+00		*	0.00E+00		*		
ARSENIC, INORGANIC	1.11E-02	3		2.16E-02	6		1.34E-05	4		9.38E-01	1	*		
BARIUM	2.10E-04	11		2.09E-03	9	*	0.00E+00			2.01E-02	3	*		
BENZALDEHYDE	* 0.00E+00		*	0.00E+00			3.59E-09	19	*	0.00E+00		*		
BENZYL ALCOHOL	8.05E-07	23	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
BERYLLIUM	9.66E-06	18		2.40E-04	13		9.36E-08	15		3.94E-04	7	*		
BIS(2-ETHYLHEXYL)PHTHALATE	1.19E-03	6	*	0.00E+00			3.79E-08	16	*	0.00E+00		*		
BUTYL BENZYL PHTHLATE	* 0.00E+00		*	0.00E+00			3.90E-10	23	*	0.00E+00		*		
CADMIUM	* 0.00E+00			2.87E-02	4		2.28E-06	7	*	0.00E+00		*		
CHLOROFORM	6.04E-06	19	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CHROMIUM(III)	1.57E-06	22		3.59E-05	16		3.40E-08	17		1.55E-04	8	*		
CHROMIUM(VI)	3.13E-04	10		7.19E-03	7		6.80E-06	5		3.09E-02	2	*		
CYANIDE (CN-)	* 0.00E+00			1.20E-03	11	*	0.00E+00		*	0.00E+00		*		
DICHLOROETHYLENE, 1,2-T-	1.69E-05	15	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
FLUORANTHENE	* 0.00E+00		*	0.00E+00			2.38E-09	20	*	0.00E+00		*		
FLUORIDE	5.03E-04	7		3.99E-02	3		2.60E-06	6	*	0.00E+00		*		
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	2.77E-03	4		7.98E-01	1		5.20E-05	3	*	0.00E+00		*		
MANGANESE	* 0.00E+00		*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
MERCURY, INORGANIC	2.01E-05	13	*	0.00E+00			2.90E-07	13	*	0.00E+00		*		
NICKEL (METALLIC)	4.44E-04	8		2.40E-03	8		6.39E-07	10		7.17E-03	4	*		
NITRATE	1.89E-05	14		1.50E-03	10		3.90E-07	11	*	0.00E+00		*		
NITRITE	9.20E-01	1		2.83E-02	5		1.69E-06	8	*	0.00E+00		*		
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,	1.40E-05	17	*	0.00E+00			2.97E-07	12	*	0.00E+00		*		
OCTYL PHTHALATE, DI-N-	* 0.00E+00		*	0.00E+00			1.09E-09	22	*	0.00E+00		*		
PHENOL	1.51E-07	24	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
PYRENE	* 0.00E+00		*	0.00E+00			2.81E-08	18	*	0.00E+00		*		
SELENIUM	5.31E-05	12	*	0.00E+00			1.82E-07	14	*	0.00E+00		*		
SILVER	1.57E-05	16		9.58E-05	15	*	0.00E+00			1.13E-03	6	*		
TETRACHLOROETHYLENE	3.32E-06	20	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
TOLUENE	1.96E-06	21	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
TRICHLOROETHANE, 1,1,1-	* 0.00E+00		*	0.00E+00			1.10E-09	21	*	0.00E+00		*		
TRINITROBENZENE, 1,3,5-	6.04E-02	2	*	0.00E+00			2.81E-04	2	*	0.00E+00		*		
TRINITROPHENYLMETHYLNITRAMINE	* 0.00E+00			2.40E-04	14	*	0.00E+00		*	0.00E+00		*		
TRINITROTOLUENE, 2,4,6-	2.26E-03	5	*	0.00E+00			1.00E+00	1	*	0.00E+00		*		
ZINC (METALLIC)	3.67E-04	9		9.58E-04	12		1.62E-06	9		2.28E-03	5	*		

APPENDIX B

Indicator Chemical Worksheets

SOUTH AREA

WORKSHEET W-1a SCORING FOR INDICATOR CHEMICAL SELECTION: CONCENTRATIONS IN WATER

CHEMNAME SITE: tds	C/N/B	Ground Water (mg/l) Low	High	Repres.	Surface Water (mg/l) Low	High	Repres.
ACENAPHTHENE	N	0.0285	0.7500				
ACETONE	N		0.0300				
ANTHRACENE	N	0.0030	0.8740				
ANTIMONY (METALLIC)	N	0.0039	0.1430		0.0034	0.0034	
ARSENIC, INORGANIC	B	0.0031	20.0000		0.0070	0.1000	
BARIUM	N	0.0079	0.9700				
BENZENE	C	0.0003	0.0980				
BENZYL ALCOHOL	N	0.0050	0.0290				
BERYLLIUM	B	0.0002	0.0500			0.0010	
BIS(2-ETHYLHEXYL)PHTHALATE	B	0.0020	0.8100			0.0020	
BROMODICHLOROMETHANE	B		0.0032				
BUTYL BENZYL PHTHLATE	N	0.0020	0.0820				
CADMIUM	B	0.0046	0.0473				
CARBON TETRACHLORIDE	B	0.0170	0.0690				
CHLOROBENZENE	N	0.0001	0.0004				
CHLOROFORM	B	0.0008	0.0282				
CHLOROMETHANE	C	0.0010	0.0026				
CHLOROPHENOL, 2-	N	0.0790	0.0800				
CHROMIUM(III)	N	0.0050	1.8850		0.0050	0.0114	
CHROMIUM(VI)	B	0.0050	1.8850		0.0050	0.0114	
CRESOL, O-	N		0.0050				
CYANIDE (CN-)	N		0.0100				
CYCLOHEXANONE	N	0.0100	0.0900				
DDD	C						
DDE	C						
DDT	B						
DIBROMOCHLOROMETHANE	B		0.0024				
DIBUTYL PHTHALATE	N						
DICHLOROBENZENE, 1,2-	N	0.0002	0.0780				
DICHLOROBENZENE, 1,4-	B	0.0004	0.1230				
DICHLOROETHANE, 1,1-	N	0.0002	0.0028				
DICHLOROETHYLENE, 1,1-	B	0.0002	0.0004				
DICHLOROETHYLENE, 1,2-C-	N	0.0019	0.0029				
DICHLOROETHYLENE, 1,2-T-	N	0.0019	0.0029				
DICHLOROMETHANE	B	0.0062	0.0716				
DICHLOROPROPANE, 1,2-	B		0.0004				
DIETHYL PHTHALATE	N						
DINITROBENZENE, 1,3-	N	0.0010	0.0095				
DINITROTOLUENE, 2,4-	C	0.0009	0.0883				
DINITROTOLUENE, 2,6-	C	0.0163	0.0205				
ETHYLBENZENE	N	0.0012	0.0878				
FLUORANTHENE	N	0.0051	0.0773				
FLUORENE	N	0.0200	1.2000				
FLUORIDE	N	0.1350	100.0000			1.0000	
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	B	0.0019	0.0158				
MANGANESE	N						
MERCURY, INORGANIC	N	0.0003	0.0009				
METHYL ISOBUTYL KETONE	N						
NAPHTHALENE	N	0.0314	3.7200				
NICKEL (METALLIC)	N	0.0050	0.1762		0.0050	0.1059	
NITRATE	N	0.0308	40.0000		1.0000	1.0000	
NITRITE	N	0.0027	18.0000		0.0400	8.6900	
NITROBENZENE	N	0.0026	0.0375				
NITROSO-DI-N-PROPYLAMINE, N-	C	0.1157	0.1198				
NITROSODIPHENYLAMINE, N-	C		0.0130				
NITROTOLUENE, O-	N						
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAN		0.0116	0.0126				
OCTYL PHTHALATE, DI-N-	N						
PENTACHLOROPHENOL	B	0.0580	0.0960				
PHENOL	N	0.0030	0.0410				
PYRENE	N	0.1132	0.1226				
SELENIUM	N	0.0033	0.2000				
SILVER	N	0.0002	1.0000		0.0002	0.0200	
TETRACHLOROETHANE, 1,1,2,2-	C						
TETRACHLOROETHYLENE	N	0.0000	0.0059				
THALLIUM (IN SOLUBLE SALTS)	*	0.0024	0.0047				
TOLUENE	N	0.0004	0.0194				
TRICHLOROETHANE, 1,1,1-	N	0.0002	0.0016				
TRICHLOROETHANE, 1,1,2-	B	0.0001	0.0002				
TRICHLOROETHYLENE	*	0.0008	0.0100				
TRINITROBENZENE, 1,3,5-	N	0.0005	0.0098			0.0043	
TRINITROPHENYLMETHYLNITRAMINE	N	0.0012	0.0190			0.0056	
TRINITROTOLUENE, 2,4,6-	B	0.0009	0.0296				
URANIUM (SOLUBLE SALTS)	N	1.1700	121.0000				
VANADIUM, METALLIC	N						

XYLENE, MIXTURE	N	0.0003	2.0000			
ZINC (METALLIC)	N	0.0010	114.0000		0.0010	0.0470

WORKSHEET W-1b SCORING FOR INDICATOR CHEMICAL SELECTION: CONCENTRATIONS IN SOIL AND SEDIMENT

CHEMNAME SITE: tds	C/N/B	Soil (mg/kg) Low	Soil (mg/kg) High	Soil (mg/kg) Repres.	Sediment (mg/kg) Low	Sediment (mg/kg) High	Sediment (mg/kg) Repres.
ACENAPHTHENE	N	1.1800	15.4000				
ACETONE	N	0.0130	6.7200				
ANTHRACENE	N	0.7590	1.3500				
ANTIMONY (METALLIC)	N						
ARSENIC, INORGANIC	B	6.4300	180.0000		9.2640	27.5750	
BARIUM	N	110.0000	1600.0000				
BENZENE	C	0.0060	2.6470				
BENZYL ALCOHOL	N						
BERYLLIUM	B	0.1360	6.3170		0.3690	0.4610	
BIS(2-ETHYLHEXYL)PHTHALATE	B	0.4470	1.5800				
BROMODICHLOROMETHANE	B						
BUTYL BENZYL PHTHLATE	N		0.7960				
CADMIUM	B	1.0700	53.4000		2.2600	3.2100	
CARBON TETRACHLORIDE	B						
CHLOROBENZENE	N						
CHLOROFORM	B		4.5300				
CHLOROMETHANE	C						
CHLOROPHENOL, 2-	N	3.0100	5.5200				
CHROMIUM(III)	N	1.3720	26500.0000		5.2080	260.0000	
CHROMIUM(VI)	B	1.3720	26500.0000		5.2080	260.0000	
CRESOL, O-	N						
CYANIDE (CN-)	N						
CYCLOHEXANONE	N						
DDD	C		5.4400				
DDE	C		2.5200				
DDT	B		2.6100				
DIBROMOCHLOROMETHANE	B						
DIBUTYL PHTHALATE	N		0.7000				
DICHLOROBENZENE, 1,2-	N		0.0470				
DICHLOROBENZENE, 1,4-	B	0.7820	3.3400				
DICHLOROETHANE, 1,1-	N						
DICHLOROETHYLENE, 1,1-	B						
DICHLOROETHYLENE, 1,2-C-	N						
DICHLOROETHYLENE, 1,2-T-	N						
DICHLOROMETHANE	B	0.0080	0.0940				
DICHLOROPROPANE, 1,2-	B						
DIETHYL PHTHALATE	N	9.0000	20.0000				
DINITROBENZENE, 1,3-	N	2.3600	2.5150				
DINITROTOLUENE, 2,4-	C	2.7000	4.5100				
DINITROTOLUENE, 2,6-	C	4.2200	4.4420				
ETHYLBENZENE	N	0.0230	2.3900				
FLUORANTHENE	N						
FLUORENE	N	0.4460	12.3000				
FLUORIDE	N	4.5020	1000.0000		26.2580	76.7030	
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	B	4.3700	4.7600				
MANGANESE	N	26.5670	345.0020				
MERCURY, INORGANIC	N	0.0290	8638.7100		0.5320	4.6510	
METHYL ISOBUTYL KETONE	N		0.0190				
NAPHTHALENE	N	0.5500	41.6000				
NICKEL (METALLIC)	N	7.0000	247.0000		9.0360	25.7670	
NITRATE	N	4.6900	10000.0000				
NITRITE	N	31.2640	2358.9170				
NITROBENZENE	N	0.9010	9.1650				
NITROSO-DI-N-PROPYLAMINE, N-	C	2.8400	3.3000				
NITROSODIPHENYLAMINE, N-	C		0.8080				
NITROTOLUENE, O-	N	13.7000	14.8910				
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAN	N	4.6300	4.8700				
OCTYL PHTHALATE, DI-N-	N		1.9700				
PENTACHLOROPHENOL	B	1.1100	5.5200				
PHENOL	N	3.3400	5.5200				
PYRENE	N	5.3500	5.7600				
SELENIUM	N					39.4240	
SILVER	N	0.0630	13.5000			0.9070	
TETRACHLOROETHANE, 1,1,2,2-	C	0.0030	0.3220				
TETRACHLOROETHYLENE	N						
THALLIUM (IN SOLUBLE SALTS)	*					34.6620	
TOLUENE	N	0.0150	1.2940				
TRICHLOROETHANE, 1,1,1-	N						
TRICHLOROETHANE, 1,1,2-	B						
TRICHLOROETHYLENE	*		0.0050				
TRINITROBENZENE, 1,3,5-	N	2.0960	2.2900				
TRINITROPHENYLMETHYLNITRAMINE	N	3.7960	10.0000				
TRINITROTOLUENE, 2,4,6-	B	4.6300	5.0050				
URANIUM (SOLUBLE SALTS)	N						
VANADIUM, METALLIC	N	26.5460	81.7860				

XYLENE, MIXTURE	N	0.0250	2.4700			
ZINC (METALLIC)	N	2.0000	2840.0000		128.3370	329.2730

WORKSHEET W-2 SCORING FOR INDICATOR SELECTION: TOXICITY DATA

CHEMNAME SITE: tds	TOX CLASS	WSS	AIR
ACENAPHTHENE	NC	6.00E-02	NA
ACETONE	NC	1.00E-01	NA
ANTHRACENE	NC	3.00E-01	NA
ANTIMONY (METALLIC)	NC	4.00E-04	NA
ARSENIC, INORGANIC	PC	NA	5.00E+01
	NC	3.00E-04	NA
BARIUM	NC	7.00E-02	5.00E-04
BENZENE	PC	2.90E-02	2.90E-02
BENZYL ALCOHOL	NC	3.00E-01	NA
BERYLLIUM	PC	4.30E+00	8.40E+00
	NC	5.00E-03	NA
BIS(2-ETHYLHEXYL)PHTHALATE	PC	1.40E-02	NA
	NC	2.00E-02	NA
BROMODICHLOROMETHANE	PC	1.30E-01	NA
	NC	2.00E-02	NA
BUTYL BENZYL PHTHLATE	NC	2.00E-01	NA
CADMIUM	PC	NA	6.10E+00
	NC	5.00E-04	NA
CARBON TETRACHLORIDE	PC	1.30E-01	5.30E-02
	NC	7.00E-04	NA
CHLOROBENZENE	NC	2.00E-02	2.00E-02
CHLOROFORM	PC	6.10E-03	8.10E-02
	NC	1.00E-02	NA
CHLOROMETHANE	PC	1.30E-02	6.30E-03
CHLOROPHENOL, 2-	NC	5.00E-03	NA
CHROMIUM(III)	NC	1.00E+00	NA
CHROMIUM(VI)	PC	NA	4.10E+01
	NC	5.00E-03	NA
CRESOL, O-	NC	5.00E-02	NA
CYANIDE (CN-)	NC	2.00E-02	NA
CYCLOHEXANONE	NC	5.00E+00	NA
DDD	PC	2.40E-01	NA
DDE	PC	3.40E-01	NA
DDT	PC	3.40E-01	3.40E-01
	NC	5.00E-04	NA
DIBROMOCHLOROMETHANE	PC	8.40E-02	NA
	NC	2.00E-02	NA
DIBUTYL PHTHALATE	NC	1.00E-01	NA
DICHLOROBENZENE, 1,2-	NC	9.00E-02	2.00E-01
DICHLOROBENZENE, 1,4-	PC	2.40E-02	NA
	NC	NA	7.00E-01
DICHLOROETHANE, 1,1-	NC	1.00E-01	5.00E-01
DICHLOROETHYLENE, 1,1-	PC	6.00E-01	1.20E+00
	NC	9.00E-03	NA
DICHLOROETHYLENE, 1,2-C-	NC	1.00E-02	NA
DICHLOROETHYLENE, 1,2-T-	NC	2.00E-02	NA
DICHLOROMETHANE	PC	7.50E-03	NA
	NC	6.00E-02	3.00E+00
DICHLOROPROPANE, 1,2-	PC	6.80E-02	NA
	NC	NA	4.00E-03
DIETHYL PHTHALATE	NC	8.00E-01	NA
DINITROBENZENE, 1,3-	NC	1.00E-04	NA
DINITROTOLUENE, 2,4-	PC	6.80E-01	NA
DINITROTOLUENE, 2,6-	PC	6.80E-01	NA
ETHYLBENZENE	NC	1.00E-01	1.00E+00
FLUORANTHENE	NC	4.00E-02	NA
FLUORENE	NC	4.00E-02	NA
FLUORIDE	NC	6.00E-02	NA
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	PC	1.10E-01	NA
	NC	3.00E-03	NA
MANGANESE	NC	1.00E-01	4.00E-04
MERCURY, INORGANIC	NC	3.00E-04	3.00E-04
METHYL ISOBUTYL KETONE	NC	5.00E-02	8.00E-02
NAPHTHALENE	NC	4.00E-02	NA
NICKEL (METALLIC)	NC	2.00E-02	NA
NITRATE	NC	1.60E+00	NA
NITRITE	NC	1.00E-01	NA
NITROBENZENE	NC	5.00E-04	2.00E-03
NITROSO-DI-N-PROPYLAMINE, N-	PC	7.00E+00	NA
NITROSODIPHENYLAMINE, N-	PC	4.90E-03	NA
NITROTOLUENE, O-	NC	1.00E-02	NA
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,	NC	5.00E-02	NA
OCTYL PHTHALATE, DI-N-	NC	2.00E-02	NA
PENTACHLOROPHENOL	PC	1.20E-01	NA
	NC	3.00E-02	NA

PHENOL	NC	6.00E-01	NA
PYRENE	NC	3.00E-02	NA
SELENIUM	NC	5.00E-03	NA
SILVER	NC	5.00E-03	NA
TETRACHLOROETHANE, 1,1,2,2-	PC	2.00E-01	2.00E-01
TETRACHLOROETHYLENE	NC	1.00E-02	NA
THALLIUM (IN SOLUBLE SALTS)	*		
TOLUENE	NC	2.00E-01	4.00E-01
TRICHLOROETHANE, 1,1,1-	NC	9.00E-02	1.00E+00
TRICHLOROETHANE, 1,1,2-	PC	5.70E-02	5.70E-02
	NC	4.00E-03	NA
TRICHLOROETHYLENE	*		
TRINITROBENZENE, 1,3,5-	NC	5.00E-05	NA
TRINITROPHENYLMETHYLNITRAMINE	NC	1.00E-02	NA
TRINITROTOLUENE, 2,4,6-	PC	3.00E-02	NA
	NC	5.00E-04	NA
URANIUM (SOLUBLE SALTS)	NC	3.00E-03	NA
VANADIUM, METALLIC	NC	7.00E-03	NA
XYLENE, MIXTURE	NC	2.00E+00	NA
ZINC (METALLIC)	NC	2.00E-01	NA

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tds	GND_H2O	RR
NITROSO-DI-N-PROPYLAMINE, N-		8.39E-01	7.17E-01
BERYLLIUM		2.15E-01	1.84E-01
DINITROTOLUENE, 2,4-		6.00E-02	5.13E-02
DINITROTOLUENE, 2,6-		1.39E-02	1.19E-02
PENTACHLOROPHENOL		1.15E-02	9.85E-03
BIS(2-ETHYLHEXYL)PHTHALATE		1.13E-02	9.70E-03
CARBON TETRACHLORIDE		8.97E-03	7.67E-03
DICHLOROBENZENE, 1,4-		2.95E-03	2.52E-03
BENZENE		2.84E-03	2.43E-03
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		1.74E-03	1.49E-03
TRINITROTOLUENE, 2,4,6-		8.88E-04	7.59E-04
DICHLOROMETHANE		5.37E-04	4.59E-04
BROMODICHLOROMETHANE		4.16E-04	3.56E-04
DICHLOROETHYLENE, 1,1-		2.40E-04	2.05E-04
DIBROMOCHLOROMETHANE		2.02E-04	1.72E-04
CHLOROFORM		1.72E-04	1.47E-04
NITROSODIPHENYLAMINE, N-		6.37E-05	5.45E-05
CHLOROMETHANE		3.38E-05	2.89E-05
DICHLOROPROPANE, 1,2-		2.72E-05	2.33E-05
TRICHLOROETHANE, 1,1,2-		1.14E-05	9.75E-06
TETRACHLOROETHANE, 1,1,2,2-	*	0.00E+00	0.00E+00
DDT	*	0.00E+00	0.00E+00
DDE	*	0.00E+00	0.00E+00
DDD	*	0.00E+00	0.00E+00
ARSENIC, INORGANIC		NA	NA
CHROMIUM(VI)		NA	NA
CADMIUM		NA	NA
TOTAL RISK FACTOR		1.17E+00	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds		SUR_H2O	RR
BERYLLIUM		4.30E-03	9.94E-01
BIS(2-ETHYLHEXYL)PHTHALATE		2.80E-05	6.47E-03
DICHLOROETHYLENE, 1,1-	*	0.00E+00	0.00E+00
CHLOROFORM	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,6-	*	0.00E+00	0.00E+00
NITROSODIPHENYLAMINE, N-	*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,4-	*	0.00E+00	0.00E+00
CHLOROMETHANE	*	0.00E+00	0.00E+00
DICHLOROBENZENE, 1,4-	*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-	*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-	*	0.00E+00	0.00E+00
DICHLOROMETHANE	*	0.00E+00	0.00E+00
TETRACHLOROETHANE, 1,1,2,2-	*	0.00E+00	0.00E+00
NITROSO-DI-N-PROPYLAMINE, N-	*	0.00E+00	0.00E+00
DDT	*	0.00E+00	0.00E+00
PENTACHLOROPHENOL	*	0.00E+00	0.00E+00
DDE	*	0.00E+00	0.00E+00
BENZENE	*	0.00E+00	0.00E+00
DDD	*	0.00E+00	0.00E+00
BROMODICHLOROMETHANE	*	0.00E+00	0.00E+00
CARBON TETRACHLORIDE	*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-	*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE	*	0.00E+00	0.00E+00
ARSENIC, INORGANIC		NA	NA
CHROMIUM(VI)		NA	NA
CADMIUM	*	NA	NA
TOTAL RISK FACTOR		4.33E-03	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds		SOIL	RR
BERYLLIUM		2.72E+01	4.45E-01
NITROSO-DI-N-PROPYLAMINE, N-		2.31E+01	3.79E-01
DINITROTOLUENE, 2,4-		3.07E+00	5.03E-02
DINITROTOLUENE, 2,6-		3.02E+00	4.95E-02
DDD		1.31E+00	2.14E-02
DDT		8.87E-01	1.45E-02
DDE		8.57E-01	1.40E-02
PENTACHLOROPHENOL		6.62E-01	1.09E-02
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		5.24E-01	8.58E-03
TRINITROTOLUENE, 2,4,6-		1.50E-01	2.46E-03
DICHLOROBENZENE, 1,4-		8.02E-02	1.31E-03
BENZENE		7.68E-02	1.26E-03
TETRACHLOROETHANE, 1,1,2,2-		6.44E-02	1.06E-03
CHLOROFORM		2.76E-02	4.53E-04
BIS(2-ETHYLHEXYL)PHTHALATE		2.21E-02	3.63E-04
NITROSODIPHENYLAMINE, N-		3.96E-03	6.49E-05
DICHLOROMETHANE		7.05E-04	1.16E-05
BROMODICHLOROMETHANE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-	*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,1-	*	0.00E+00	0.00E+00
CARBON TETRACHLORIDE	*	0.00E+00	0.00E+00
CHLOROMETHANE	*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-	*	0.00E+00	0.00E+00
ARSENIC, INORGANIC		NA	NA
CHROMIUM(VI)		NA	NA
CADMIUM		NA	NA
TOTAL RISK FACTOR		6.10E+01	1.00E+00

WORKSHEET W-3 RISK FACTORS & RELATIVE RISK by MEDIA - PC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tds		SEDIM	RR
BERYLLIUM			1.98E+00	1.00E+00
CHLOROFORM		*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE		*	0.00E+00	0.00E+00
NITROSODIPHENYLAMINE, N-		*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,6-		*	0.00E+00	0.00E+00
DICHLOROMETHANE		*	0.00E+00	0.00E+00
DDT		*	0.00E+00	0.00E+00
BROMODICHLOROMETHANE		*	0.00E+00	0.00E+00
PENTACHLOROPHENOL		*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-		*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-		*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE		*	0.00E+00	0.00E+00
BENZENE		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,1-		*	0.00E+00	0.00E+00
NITROSO-DI-N-PROPYLAMINE, N-		*	0.00E+00	0.00E+00
CARBON TETRACHLORIDE		*	0.00E+00	0.00E+00
DDD		*	0.00E+00	0.00E+00
CHLOROMETHANE		*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-		*	0.00E+00	0.00E+00
TETRACHLOROETHANE, 1,1,2,2-		*	0.00E+00	0.00E+00
DDE		*	0.00E+00	0.00E+00
DICHLOROBENZENE, 1,4-		*	0.00E+00	0.00E+00
DINITROTOLUENE, 2,4-		*	0.00E+00	0.00E+00
ARSENIC, INORGANIC			NA	NA
CHROMIUM(VI)			NA	NA
CADMIUM			NA	NA
TOTAL RISK FACTOR			1.98E+00	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"**" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tds	GND_H2O	RR
ARSENIC, INORGANIC		6.67E+04	5.99E-01
URANIUM (SOLUBLE SALTS)		4.03E+04	3.62E-01
FLUORIDE		1.67E+03	1.50E-02
ZINC (METALLIC)		5.70E+02	5.12E-03
CHROMIUM(VI)		3.77E+02	3.39E-03
ANTIMONY (METALLIC)		3.57E+02	3.21E-03
SILVER		2.00E+02	1.80E-03
TRINITROBENZENE, 1,3,5-		1.96E+02	1.76E-03
NITRITE		1.80E+02	1.62E-03
CARBON TETRACHLORIDE		9.86E+01	8.86E-04
DINITROBENZENE, 1,3-		9.50E+01	8.54E-04
CADMIUM		9.46E+01	8.50E-04
NAPHTHALENE		9.30E+01	8.36E-04
NITROBENZENE		7.50E+01	6.74E-04
TRINITROTOLUENE, 2,4,6-		5.92E+01	5.32E-04
BIS(2-ETHYLHEXYL)PHTHALATE		4.05E+01	3.64E-04
SELENIUM		4.00E+01	3.59E-04
FLUORENE		3.00E+01	2.70E-04
NITRATE		2.50E+01	2.25E-04
CHLOROPHENOL, 2-		1.60E+01	1.44E-04
BARIUM		1.39E+01	1.25E-04
ACENAPHTHENE		1.25E+01	1.12E-04
BERYLLIUM		1.00E+01	8.99E-05
NICKEL (METALLIC)		8.81E+00	7.92E-05
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		5.27E+00	4.73E-05
PYRENE		4.09E+00	3.67E-05
PENTACHLOROPHENOL		3.20E+00	2.88E-05
MERCURY, INORGANIC		3.00E+00	2.70E-05
ANTHRACENE		2.91E+00	2.62E-05
CHLOROFORM		2.82E+00	2.53E-05
FLUORANTHENE		1.93E+00	1.74E-05
TRINITROPHENYLMETHYLNITRAMINE		1.90E+00	1.71E-05
CHROMIUM(III)		1.89E+00	1.69E-05
DICHLOROMETHANE		1.19E+00	1.07E-05
XYLENE, MIXTURE		1.00E+00	8.99E-06
ETHYLBENZENE		8.78E-01	7.89E-06
DICHLOROBENZENE, 1,2-		8.67E-01	7.79E-06
TETRACHLOROETHYLENE		5.90E-01	5.30E-06
CYANIDE (CN-)		5.00E-01	4.49E-06
BUTYL BENZYL PHTHLATE		4.10E-01	3.68E-06
ACETONE		3.00E-01	2.70E-06
DICHLOROETHYLENE, 1,2-C-		2.90E-01	2.61E-06
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		2.52E-01	2.26E-06
BROMODICHLOROMETHANE		1.60E-01	1.44E-06
DICHLOROETHYLENE, 1,2-T-		1.45E-01	1.30E-06
DIBROMOCHLOROMETHANE		1.20E-01	1.08E-06
CRESOL, O-		1.00E-01	8.99E-07
TOLUENE		9.70E-02	8.72E-07
BENZYL ALCOHOL		9.67E-02	8.69E-07
PHENOL		6.83E-02	6.14E-07
TRICHLOROETHANE, 1,1,2-		5.00E-02	4.49E-07
DICHLOROETHYLENE, 1,1-		4.44E-02	3.99E-07
DICHLOROETHANE, 1,1-		2.80E-02	2.52E-07
CHLOROBENZENE		2.00E-02	1.80E-07
CYCLOHEXANONE		1.80E-02	1.62E-07
TRICHLOROETHANE, 1,1,1-		1.78E-02	1.60E-07
METHYL ISOBUTYL KETONE	*	0.00E+00	0.00E+00
NITROTOLUENE, O-	*	0.00E+00	0.00E+00
DDT	*	0.00E+00	0.00E+00
MANGANESE	*	0.00E+00	0.00E+00
DIETHYL PHTHALATE	*	0.00E+00	0.00E+00
VANADIUM, METALLIC	*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-	*	0.00E+00	0.00E+00
DIBUTYL PHTHALATE	*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-		NA	NA
DICHLOROBENZENE, 1,4-		NA	NA
TOTAL RISK FACTOR		1.11E+05	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"*" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME	SITE: tds		SUR_H2O	RR
ARSENIC, INORGANIC			3.33E+02	6.12E-01
NITRITE			8.69E+01	1.60E-01
TRINITROBENZENE, 1,3,5-			8.60E+01	1.58E-01
FLUORIDE			1.67E+01	3.06E-02
ANTIMONY (METALLIC)			8.50E+00	1.56E-02
NICKEL (METALLIC)			5.29E+00	9.72E-03
SILVER			4.00E+00	7.34E-03
CHROMIUM(VI)			2.28E+00	4.19E-03
NITRATE			6.25E-01	1.15E-03
TRINITROPHENYLMETHYLNITRAMINE			5.60E-01	1.03E-03
ZINC (METALLIC)			2.35E-01	4.31E-04
BERYLLIUM			2.00E-01	3.67E-04
BIS(2-ETHYLHEXYL)PHTHALATE			1.00E-01	1.84E-04
CHROMIUM(III)			1.14E-02	2.09E-05
DICHLOROMETHANE		*	0.00E+00	0.00E+00
ACETONE		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-C-		*	0.00E+00	0.00E+00
SELENIUM		*	0.00E+00	0.00E+00
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		*	0.00E+00	0.00E+00
NITROBENZENE		*	0.00E+00	0.00E+00
BROMODICHLOROMETHANE		*	0.00E+00	0.00E+00
BARIUM		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-		*	0.00E+00	0.00E+00
NAPHTHALENE		*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE		*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		*	0.00E+00	0.00E+00
CRESOL, O-		*	0.00E+00	0.00E+00
PENTACHLOROPHENOL		*	0.00E+00	0.00E+00
TOLUENE		*	0.00E+00	0.00E+00
ANTHRACENE		*	0.00E+00	0.00E+00
BENZYL ALCOHOL		*	0.00E+00	0.00E+00
FLUORANTHENE		*	0.00E+00	0.00E+00
PHENOL		*	0.00E+00	0.00E+00
CARBON TETRACHLORIDE		*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-		*	0.00E+00	0.00E+00
XYLENE, MIXTURE		*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,1-		*	0.00E+00	0.00E+00
DICHLOROBENZENE, 1,2-		*	0.00E+00	0.00E+00
DICHLOROETHANE, 1,1-		*	0.00E+00	0.00E+00
CYANIDE (CN-)		*	0.00E+00	0.00E+00
CHLOROBENZENE		*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-		*	0.00E+00	0.00E+00
CYCLOHEXANONE		*	0.00E+00	0.00E+00
CHLOROPHENOL, 2-		*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,1-		*	0.00E+00	0.00E+00
CADMIUM		*	0.00E+00	0.00E+00
METHYL ISOBUTYL KETONE		*	0.00E+00	0.00E+00
MERCURY, INORGANIC		*	0.00E+00	0.00E+00
NITROTOLUENE, O-		*	0.00E+00	0.00E+00
DINITROBENZENE, 1,3-		*	0.00E+00	0.00E+00
DDT		*	0.00E+00	0.00E+00
ETHYLBENZENE		*	0.00E+00	0.00E+00
MANGANESE		*	0.00E+00	0.00E+00
BUTYL BENZYL PHTHLATE		*	0.00E+00	0.00E+00
DIETHYL PHTHALATE		*	0.00E+00	0.00E+00
ACENAPHTHENE		*	0.00E+00	0.00E+00
VANADIUM, METALLIC		*	0.00E+00	0.00E+00
CHLOROFORM		*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-		*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE		*	0.00E+00	0.00E+00
DIBUTYL PHTHALATE		*	0.00E+00	0.00E+00
PYRENE		*	0.00E+00	0.00E+00
FLUORENE		*	0.00E+00	0.00E+00
URANIUM (SOLUBLE SALTS)		*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-		*	NA	NA
DICHLOROBENZENE, 1,4-		*	NA	NA
TOTAL RISK FACTOR			5.45E+02	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds		SOIL	RR
MERCURY, INORGANIC		2.88E+07	8.21E-01
CHROMIUM(VI)		5.30E+06	1.51E-01
ARSENIC, INORGANIC		6.00E+05	1.71E-02
CADMIUM		1.07E+05	3.05E-03
TRINITROBENZENE, 1,3,5-		4.58E+04	1.31E-03
CHROMIUM(III)		2.65E+04	7.56E-04
DINITROBENZENE, 1,3-		2.52E+04	7.17E-04
NITRITE		2.36E+04	6.73E-04
BARIUM		2.29E+04	6.52E-04
NITROBENZENE		1.83E+04	5.23E-04
FLUORIDE		1.67E+04	4.75E-04
ZINC (METALLIC)		1.42E+04	4.05E-04
NICKEL (METALLIC)		1.24E+04	3.52E-04
VANADIUM, METALLIC		1.17E+04	3.33E-04
TRINITROTOLUENE, 2,4,6-		1.00E+04	2.86E-04
NITRATE		6.25E+03	1.78E-04
DDT		5.22E+03	1.49E-04
MANGANESE		3.45E+03	9.84E-05
SILVER		2.70E+03	7.70E-05
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE		1.59E+03	4.53E-05
NITROTOLUENE, O-		1.49E+03	4.25E-05
BERYLLIUM		1.26E+03	3.60E-05
CHLOROPHENOL, 2-		1.10E+03	3.15E-05
NAPHTHALENE		1.04E+03	2.97E-05
TRINITROPHENYLMETHYLNITRAMINE		1.00E+03	2.85E-05
CHLOROFORM		4.53E+02	1.29E-05
FLUORENE		3.08E+02	8.77E-06
ACENAPHTHENE		2.57E+02	7.32E-06
PYRENE		1.92E+02	5.48E-06
PENTACHLOROPHENOL		1.84E+02	5.25E-06
OCTYL PHTHALATE, DI-N-		9.85E+01	2.81E-06
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA		9.74E+01	2.78E-06
BIS(2-ETHYLHEXYL)PHTHALATE		7.90E+01	2.25E-06
ACETONE		6.72E+01	1.92E-06
DIETHYL PHTHALATE		2.50E+01	7.13E-07
ETHYLBENZENE		2.39E+01	6.82E-07
PHENOL		9.20E+00	2.62E-07
DIBUTYL PHTHALATE		7.00E+00	2.00E-07
TOLUENE		6.47E+00	1.85E-07
ANTHRACENE		4.50E+00	1.28E-07
BUTYL BENZYL PHTHLATE		3.98E+00	1.14E-07
DICHLOROMETHANE		1.57E+00	4.47E-08
XYLENE, MIXTURE		1.24E+00	3.52E-08
DICHLOROBENZENE, 1,2-		5.22E-01	1.49E-08
METHYL ISOBUTYL KETONE		3.80E-01	1.08E-08
CARBON TETRACHLORIDE	*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,1-	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-	*	0.00E+00	0.00E+00
CHLOROBENZENE	*	0.00E+00	0.00E+00
BROMODICHLOROMETHANE	*	0.00E+00	0.00E+00
DICHLOROETHANE, 1,1-	*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-	*	0.00E+00	0.00E+00
SELENIUM	*	0.00E+00	0.00E+00
BENZYL ALCOHOL	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-C-	*	0.00E+00	0.00E+00
CYCLOHEXANONE	*	0.00E+00	0.00E+00
ANTIMONY (METALLIC)	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,1-	*	0.00E+00	0.00E+00
URANIUM (SOLUBLE SALTS)	*	0.00E+00	0.00E+00
CRESOL, O-	*	0.00E+00	0.00E+00
FLUORANTHENE	*	0.00E+00	0.00E+00
CYANIDE (CN-)	*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-	*	NA	NA
DICHLOROBENZENE, 1,4-		NA	NA
TOTAL RISK FACTOR		3.51E+07	1.00E+00

WORKSHEET W-4 RISK FACTORS & RELATIVE RISK by MEDIA - NC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds		SEDIM	RR
ARSENIC, INORGANIC		9.19E+04	5.15E-01
CHROMIUM(VI)		5.20E+04	2.91E-01
MERCURY, INORGANIC		1.55E+04	8.69E-02
SELENIUM		7.88E+03	4.42E-02
CADMIUM		6.42E+03	3.60E-02
ZINC (METALLIC)		1.65E+03	9.22E-03
NICKEL (METALLIC)		1.29E+03	7.22E-03
FLUORIDE		1.28E+03	7.16E-03
CHROMIUM(III)		2.60E+02	1.46E-03
SILVER		1.81E+02	1.02E-03
BERYLLIUM		9.22E+01	5.17E-04
ACETONE	*	0.00E+00	0.00E+00
ANTHRACENE	*	0.00E+00	0.00E+00
NITROBENZENE	*	0.00E+00	0.00E+00
BUTYL BENZYL PHTHLATE	*	0.00E+00	0.00E+00
TRINITROTOLUENE, 2,4,6-	*	0.00E+00	0.00E+00
DICHLOROMETHANE	*	0.00E+00	0.00E+00
DDT	*	0.00E+00	0.00E+00
XYLENE, MIXTURE	*	0.00E+00	0.00E+00
BARIUM	*	0.00E+00	0.00E+00
DICHLOROBENZENE, 1,2-	*	0.00E+00	0.00E+00
NITROTOLUENE, O-	*	0.00E+00	0.00E+00
METHYL ISOBUTYL KETONE	*	0.00E+00	0.00E+00
CHLOROPHENOL, 2-	*	0.00E+00	0.00E+00
CARBON TETRACHLORIDE	*	0.00E+00	0.00E+00
TRINITROPHENYLMETHYLNITRAMINE	*	0.00E+00	0.00E+00
DIBROMOCHLOROMETHANE	*	0.00E+00	0.00E+00
FLUORENE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,1-	*	0.00E+00	0.00E+00
PYRENE	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-T-	*	0.00E+00	0.00E+00
OCTYL PHTHALATE, DI-N-	*	0.00E+00	0.00E+00
CHLOROBENZENE	*	0.00E+00	0.00E+00
BIS(2-ETHYLHEXYL)PHTHALATE	*	0.00E+00	0.00E+00
BROMODICHLOROMETHANE	*	0.00E+00	0.00E+00
DIETHYL PHTHALATE	*	0.00E+00	0.00E+00
DICHLOROETHANE, 1,1-	*	0.00E+00	0.00E+00
PHENOL	*	0.00E+00	0.00E+00
TETRACHLOROETHYLENE	*	0.00E+00	0.00E+00
TOLUENE	*	0.00E+00	0.00E+00
TRICHLOROETHANE, 1,1,2-	*	0.00E+00	0.00E+00
NITRATE	*	0.00E+00	0.00E+00
TRINITROBENZENE, 1,3,5-	*	0.00E+00	0.00E+00
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE	*	0.00E+00	0.00E+00
BENZYL ALCOHOL	*	0.00E+00	0.00E+00
NAPHTHALENE	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,2-C-	*	0.00E+00	0.00E+00
ACENAPHTHENE	*	0.00E+00	0.00E+00
CYCLOHEXANONE	*	0.00E+00	0.00E+00
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRA	*	0.00E+00	0.00E+00
ANTIMONY (METALLIC)	*	0.00E+00	0.00E+00
ETHYLBENZENE	*	0.00E+00	0.00E+00
DICHLOROETHYLENE, 1,1-	*	0.00E+00	0.00E+00
VANADIUM, METALLIC	*	0.00E+00	0.00E+00
URANIUM (SOLUBLE SALTS)	*	0.00E+00	0.00E+00
NITRITE	*	0.00E+00	0.00E+00
CRESOL, O-	*	0.00E+00	0.00E+00
PENTACHLOROPHENOL	*	0.00E+00	0.00E+00
FLUORANTHENE	*	0.00E+00	0.00E+00
DIBUTYL PHTHALATE	*	0.00E+00	0.00E+00
CYANIDE (CN-)	*	0.00E+00	0.00E+00
CHLOROFORM	*	0.00E+00	0.00E+00
MANGANESE	*	0.00E+00	0.00E+00
DINITROBENZENE, 1,3-	*	0.00E+00	0.00E+00
DICHLOROPROPANE, 1,2-	*	NA	NA
DICHLOROBENZENE, 1,4-	*	NA	NA
TOTAL RISK FACTOR		1.78E+05	1.00E+00

WORKSHEET W-5 RANK & RELATIVE RISK by MEDIA - PC GROUP

"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds	GND_H2O RR	RANK		SUR_H2O RR	RANK	SOIL RR	RANK		SEDIM RR	RANK	AIR RR	RANK
ARSENIC, INORGANIC	NA	NA		NA	NA	NA	NA		NA	NA	*	
BENZENE	2.43E-03	9	*	0.00E+00		1.26E-03	12	*	0.00E+00		*	
BERYLLIUM	1.84E-01	2		9.94E-01	1	4.45E-01	1		1.00E+00	1	*	
BIS(2-ETHYLHEXYL)PHTHALATE	9.70E-03	6		6.47E-03	2	3.63E-04	15	*	0.00E+00		*	
BROMODICHLOROMETHANE	3.56E-04	13	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
CADMIUM	NA	NA	*	NA	NA	NA	NA		NA	NA	*	
CARBON TETRACHLORIDE	7.67E-03	7	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
CHLOROFORM	1.47E-04	16	*	0.00E+00		4.53E-04	14	*	0.00E+00		*	
CHLOROMETHANE	2.89E-05	18	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
CHROMIUM(VI)	NA	NA		NA	NA	NA	NA		NA	NA	*	
DDD	* 0.00E+00		*	0.00E+00		2.14E-02	5	*	0.00E+00		*	
DDE	* 0.00E+00		*	0.00E+00		1.40E-02	7	*	0.00E+00		*	
DDT	* 0.00E+00		*	0.00E+00		1.45E-02	6	*	0.00E+00		*	
DIBROMOCHLOROMETHANE	1.72E-04	15	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
DICHLOROBENZENE, 1,4-	2.52E-03	8	*	0.00E+00		1.31E-03	11	*	0.00E+00		*	
DICHLOROETHYLENE, 1,1-	2.05E-04	14	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
DICHLOROMETHANE	4.59E-04	12	*	0.00E+00		1.16E-05	17	*	0.00E+00		*	
DICHLOROPROPANE, 1,2-	2.33E-05	19	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
DINITROTOLUENE, 2,4-	5.13E-02	3	*	0.00E+00		5.03E-02	3	*	0.00E+00		*	
DINITROTOLUENE, 2,6-	1.19E-02	4	*	0.00E+00		4.95E-02	4	*	0.00E+00		*	
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	1.49E-03	10	*	0.00E+00		8.58E-03	9	*	0.00E+00		*	
NITROSO-DI-N-PROPYLAMINE, N-	7.17E-01	1	*	0.00E+00		3.79E-01	2	*	0.00E+00		*	
NITROSODIPHENYLAMINE, N-	5.45E-05	17	*	0.00E+00		6.49E-05	16	*	0.00E+00		*	
PENTACHLOROPHENOL	9.85E-03	5	*	0.00E+00		1.09E-02	8	*	0.00E+00		*	
TETRACHLOROETHANE, 1,1,2,2-	* 0.00E+00		*	0.00E+00		1.06E-03	13	*	0.00E+00		*	
TRICHLOROETHANE, 1,1,2-	9.75E-06	20	*	0.00E+00		* 0.00E+00		*	0.00E+00		*	
TRINITROTOLUENE, 2,4,6-	7.59E-04	11	*	0.00E+00		2.46E-03	10	*	0.00E+00		*	

WORKSHEET W-6 RANK & RELATIVE RISK by MEDIA - NC GROUP
"***" INDICATES NO DATA. "NA" INDICATES NO TOXICITY VALUE.

CHEMNAME SITE: tds	GND_H2O RR	RANK		SUR_H2O RR	RANK		SOIL RR	RANK		SEDIM RR	RANK		AIR RR	RANK
ACENAPHTHENE	1.12E-04	22	*	0.00E+00			7.32E-06	28	*	0.00E+00		*		
ACETONE	2.70E-06	41	*	0.00E+00			1.92E-06	34	*	0.00E+00		*		
ANTHRACENE	2.62E-05	29	*	0.00E+00			1.28E-07	40	*	0.00E+00		*		
ANTIMONY (METALLIC)	3.21E-03	6		1.56E-02	5	*	0.00E+00		*	0.00E+00		*		
ARSENIC, INORGANIC	5.99E-01	1		6.12E-01	1		1.71E-02	3		5.15E-01	1	*		
BARIUM	1.25E-04	21	*	0.00E+00			6.52E-04	9	*	0.00E+00		*		
BENZYL ALCOHOL	8.69E-07	49	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
BERYLLIUM	8.99E-05	23		3.67E-04	12		3.60E-05	22		5.17E-04	11	*		
BIS(2-ETHYLHEXYL)PHTHALATE	3.64E-04	16		1.84E-04	13		2.25E-06	33	*	0.00E+00		*		
BROMODICHLOROMETHANE	1.44E-06	44	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
BUTYL BENZYL PHTHLATE	3.68E-06	40	*	0.00E+00			1.14E-07	41	*	0.00E+00		*		
CADMIUM	8.50E-04	12	*	0.00E+00			3.05E-03	4		3.60E-02	5	*		
CARBON TETRACHLORIDE	8.86E-04	10	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CHLOROBENZENE	1.80E-07	54	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CHLOROFORM	2.53E-05	30	*	0.00E+00			1.29E-05	26	*	0.00E+00		*		
CHLOROPHENOL, 2-	1.44E-04	20	*	0.00E+00			3.15E-05	23	*	0.00E+00		*		
CHROMIUM(III)	1.69E-05	33		2.09E-05	14		7.56E-04	6		1.46E-03	9	*		
CHROMIUM(VI)	3.39E-03	5		4.19E-03	8		1.51E-01	2		2.91E-01	2	*		
CRESOL, O-	8.99E-07	47	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CYANIDE (CN-)	4.49E-06	39	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
CYCLOHEXANONE	1.62E-07	55	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DDT	0.00E+00		*	0.00E+00			1.49E-04	17	*	0.00E+00		*		
DIBROMOCHLOROMETHANE	1.08E-06	46	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DIBUTYL PHTHALATE	0.00E+00		*	0.00E+00			2.00E-07	38	*	0.00E+00		*		
DICHLOROBENZENE, 1,2-	7.79E-06	37	*	0.00E+00			1.49E-08	44	*	0.00E+00		*		
DICHLOROBENZENE, 1,4-	NA	NA	*	NA	NA		NA	NA	*	NA	NA	*		
DICHLOROETHANE, 1,1-	2.52E-07	53	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DICHLOROETHYLENE, 1,1-	3.99E-07	52	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DICHLOROETHYLENE, 1,2-C-	2.61E-06	42	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DICHLOROETHYLENE, 1,2-T-	1.30E-06	45	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
DICHLOROMETHANE	1.07E-05	34	*	0.00E+00			4.47E-08	42	*	0.00E+00		*		
DICHLOROPROPANE, 1,2-	NA	NA	*	NA	NA	*	NA	NA	*	NA	NA	*		
DIETHYL PHTHALATE	0.00E+00		*	0.00E+00			7.13E-07	35	*	0.00E+00		*		
DINITROBENZENE, 1,3-	8.54E-04	11	*	0.00E+00			7.17E-04	7	*	0.00E+00		*		
ETHYLBENZENE	7.89E-06	36	*	0.00E+00			6.82E-07	36	*	0.00E+00		*		
FLUORANTHENE	1.74E-05	31	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
FLUORENE	2.70E-04	18	*	0.00E+00			8.77E-06	27	*	0.00E+00		*		
FLUORIDE	1.50E-02	3		3.06E-02	4		4.75E-04	11		7.16E-03	8	*		
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIA	4.73E-05	25	*	0.00E+00			4.53E-05	20	*	0.00E+00		*		
MANGANESE	0.00E+00		*	0.00E+00			9.84E-05	18	*	0.00E+00		*		
MERCURY, INORGANIC	2.70E-05	28	*	0.00E+00			8.21E-01	1		8.69E-02	3	*		
METHYL ISOBUTYL KETONE	0.00E+00		*	0.00E+00			1.08E-08	45	*	0.00E+00		*		
NAPHTHALENE	8.36E-04	13	*	0.00E+00			2.97E-05	24	*	0.00E+00		*		
NICKEL (METALLIC)	7.92E-05	24		9.72E-03	6		3.52E-04	13		7.22E-03	7	*		
NITRATE	2.25E-04	19		1.15E-03	9		1.78E-04	16	*	0.00E+00		*		
NITRITE	1.62E-03	9		1.60E-01	2		6.73E-04	8	*	0.00E+00		*		
NITROBENZENE	6.74E-04	14	*	0.00E+00			5.23E-04	10	*	0.00E+00		*		
NITROTOLUENE, O-	0.00E+00		*	0.00E+00			4.25E-05	21	*	0.00E+00		*		
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,	2.26E-06	43	*	0.00E+00			2.78E-06	32	*	0.00E+00		*		
OCTYL PHTHALATE, DI-N-	0.00E+00		*	0.00E+00			2.81E-06	31	*	0.00E+00		*		
PENTACHLOROPHENOL	2.88E-05	27	*	0.00E+00			5.25E-06	30	*	0.00E+00		*		
PHENOL	6.14E-07	50	*	0.00E+00			2.62E-07	37	*	0.00E+00		*		
PYRENE	3.67E-05	26	*	0.00E+00			5.48E-06	29	*	0.00E+00		*		
SELENIUM	3.59E-04	17	*	0.00E+00		*	0.00E+00			4.42E-02	4	*		
SILVER	1.80E-03	7		7.34E-03	7		7.70E-05	19		1.02E-03	10	*		
TETRACHLOROETHYLENE	5.30E-06	38	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
TOLUENE	8.72E-07	48	*	0.00E+00			1.85E-07	39	*	0.00E+00		*		
TRICHLOROETHANE, 1,1,1-	1.60E-07	56	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
TRICHLOROETHANE, 1,1,2-	4.49E-07	51	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
TRINITROBENZENE, 1,3,5-	1.76E-03	8		1.58E-01	3		1.31E-03	5	*	0.00E+00		*		
TRINITROPHENYLMETHYLNITRAMINE	1.71E-05	32		1.03E-03	10		2.85E-05	25	*	0.00E+00		*		
TRINITROTOLUENE, 2,4,6-	5.32E-04	15	*	0.00E+00			2.86E-04	15	*	0.00E+00		*		
URANIUM (SOLUBLE SALTS)	3.62E-01	2	*	0.00E+00		*	0.00E+00		*	0.00E+00		*		
VANADIUM, METALLIC	0.00E+00		*	0.00E+00			3.33E-04	14	*	0.00E+00		*		
XYLENE, MIXTURE	8.99E-06	35	*	0.00E+00			3.52E-08	43	*	0.00E+00		*		
ZINC (METALLIC)	5.12E-03	4		4.31E-04	11		4.05E-04	12		9.22E-03	6	*		

APPENDIX B

SUMMARY RESULTS OF USRADS GEOPHYSICAL SURVEYS
(excluding individual track maps)

1.0 INTRODUCTION

EODT Services, Inc. (EODT-S) of Oak Ridge, Tennessee, conducted geophysical surveys for the RI at TEAD-N from May 18, 1992 through June 3, 1992. The surveys were performed using an Ultrasonic Ranging and Data System (USRADS). A total of 65 surveys were conducted in four areas of TEAD-N, and this appendix provides a summary of the results. It, also, provides maps showing the survey coverage and maps that document the anomalies detected. Raw data, in the form of individual "track maps," are not provided.

2.0 DESCRIPTIONS OF THE SURVEY SITES

The following subsections describe the four areas under the RI that were known or suspected to contain former trenches and pits and where geophysical surveys were conducted.

2.1 OLD BURN AREA (Site 6)

The Old Burn Area was used for the testing of HC-filled munitions, fuses, and propellants until the early 1970s. A revetment area is located in the eastern portion of the site, and historical aerial photographs indicate several trenches were present within this revetment. The remainder of the Old Burn Area consists of a large field approximately 1/4 mile by 1/2 mile in size. The field gently slopes from south to north and contains disturbed areas believed to be former trench areas that have been graded over. The field was used for the surface burning of wooden boxes and crates and some explosives testing. Scrap metal, detonators, expended smoke grenades, and charred wood were items observed on the ground surface. Geophysical surveys were conducted during a previous investigation by Weston (1990) at the Old Burn Area. These surveys covered approximately two-thirds of the Old Burn Area according to historical aerial photographs of former trench areas.

The USRADS surveys conducted during the current RI covered the entire Old Burn Area in order to further define the locations of former trenches. The surveys were conducted on a 200-by-200-foot grid over an area extending 1,000 feet north-south by 2,200 feet east-west.

2.2 OLD BURN STAGING AREA (Site 36)

The Old Burn Staging Area, located just north of the Old Burn Area, was a former gravel pit used for the temporary storage of materials to be burned in the Old Burn Area. On the basis of historical aerial photographs, it was believed that trenching in the pit may have occurred and that dark areas within the pit may have been related to standing liquid. During a site visit in October 1991, several dark areas within the pit were observed that appeared to be related to surface burning within the pit. There was no surface evidence of previous trenching within the pit. To the north of the pit there was surface evidence of burning activities (i.e., charred wood and metal).

USRADS surveys were conducted within the pit and in an area to the north of the pit where evidence of burning activities was observed. The entire pit area and an area to the north of the pit were surveyed to determine whether any buried materials in trenches or pits are present at the Old Burn Staging Area.

2.3 CHEMICAL RANGE (Site 7)

The Chemical Range, located in the southwestern portion of the ordnance area, was used for the testing and disposal of munitions, including CS grenades, flares, smoke pots, projectiles, and incendiary items such as bombs, pouch and document destroyers, and flame thrower igniters. Prior to 1991, there were two open trenches where spent munitions were placed. In 1991, these trenches were filled with soil and the surface was graded. In addition to the two former trenches, a geophysical survey by Weston (1990) indicated a possible third trench at the site.

An USRADS was conducted at the Chemical Range to locate the two known trenches and to attempt to verify the location of the possible third trench. A 20-by-20-foot grid was established over a 200-by-240-foot area.

2.4 AED TEST RANGE (Site 40)

The AED Test Range consists of a testing facility that has been active since the 1950s for the testing of munitions, rocket engines, and bombs. The facility contains six revetments, a drop tower, and an area of trenches and bomb craters. Because of the various testing activities that were performed in the area, it was suspected that buried materials were present in former trenches and pits at the AED Test Range.

USRADS surveys were conducted within each revetment area at the AED Test Range to determine if buried materials are present.

3.0 USRADS DESCRIPTION AND SURVEY METHODOLOGY

The USRADS used for the RI at TEAD-N utilized a Model EM-31 ground conductivity meter, which was interfaced to the USRADS for the detection and mapping of ground conductivity.

3.1 EM-31 GROUND CONDUCTIVITY METER

The EM-31 measures an induced magnetic field in two components. The first is the quadrature-phase component which provides the ground conductivity measurement. The second is the in phase component used primarily in the EM-31 for calibration purposes. Measurement of the ground resistivity is recorded in ohm-centimeters.

The EM-31 has a transmitter coil located at one end of the instrument, which induces circular eddy current loops in the earth. Under certain conditions fulfilled in the design of the EM-31, the magnitude of any one of these current loops is directly proportional to the terrain conductivity in the vicinity of that loop. Each one of the current loops generates a magnetic field that is proportional to the value of the current flowing within that loop. A part of the magnetic field from each loop is intercepted by the receiver coil in the other end of the EM-31 and results in an input voltage which is therefore linearly related to the terrain conductivity. This output signal has been interfaced to the USRADS so that the changes can be correlated to an X,Y location.

3.2 BASIC METHODOLOGY

The USRADS emits a unique ultrasonic signal from the surveyor's data pack each second. At precisely the same instant, an RF transmission is sent to the computer system located in a field van. Since RF transmissions travel at essentially the speed of light, it can be considered instantaneous when compared to the speed of sound. This RF transmission from the data pack to the computer is used to indicate the start time for the ultrasonic signal. Stationary receivers are placed throughout the area being surveyed. These receivers contain both an ultrasonic receiver and an RF transmitter. If a stationary receiver hears a valid ultrasonic signal, it transmits, via the RF link between the receiver and the computer, a signal indicating that the signal has been received. When the computer receives this signal, it uses it as the stop signal for that particular receiver. In this manner, the time required for the sound to travel from the data pack to a particular receiver location is recorded. As each receiver responds to the ultrasonic signal, corresponding stop signals are sent and the distance is calculated. From this information, the location of the surveyor is established each second.

To accomplish the necessary correlation between the surveyor's location and the magnetometer, the RF start signal is encoded with the data collected during the previous second. As the position is determined each second by the computer, a dot is plotted on the computer screen in relation to the receivers that have been placed within the survey grid. The data collected for the second are displayed at the bottom of the computer screen to provide visual feedback as to the data integrity. The plotted position remains on the computer screen while the status line containing the actual data values is updated each second to conserve screen space for plotting the surveyor's track map. At any time during the survey, the surveyor may look at the track map to determine if there are any areas that have been missed and, if so, if additional data can be collected for those areas. Therefore, the surveyor can concentrate on obtaining full coverage of the survey grid in a minimum amount of time.

When adequate data have been collected to characterize the survey grid, the survey can be terminated and the data analyzed. The surveyor can analyze the data using a variety of methods to review the survey coverage and identify anomalies or other areas of interest.

In accordance with the Final Field Sampling Plan (Volume II) for the RI at TEAD-N, a "Modified Remediation Protocol" was utilized during the survey. This protocol is an

assessment of an area utilizing 50-, 20-, and 10-foot sweep lanes. Two passes over the same area (cross hatch) were made. This protocol resulted in better documentation of the location of subsurface anomalies versus conventional geophysical surveying methods.

4.0 INTERPRETATION OF SURVEY RESULTS

EODT Services, Inc., provided a graphic presentation of the data in the form of "track maps" and composite anomaly maps. An example of a track map is provided in Figure B-1. The track map is a two-dimensional plot with multi-level color contours plotted above the plot of the survey lines to show the magnitude of the anomaly at any given point along each survey line. A track map was produced for each survey grid. The magnitude of the anomaly is expressed according to the following color key:

SIGNAL LEVEL(ohm/cm)	COLOR
0 - 5	GREEN
5 -10	BLUE
10-15	MAGENTA
15-20	YELLOW
20-UP	RED

As shown on Figure B-1, the plots were created so that the higher the measurement, the greater the color intensity. When an anomaly appeared on the computer screen, the surveyor was directed to criss cross the anomaly area for better definition. This allowed immediate definition of specific target areas.

An anomaly map was prepared by combining the data from each individual survey grid track map. The anomaly map was prepared using the same color key as above with color intensity increasing with the increasing magnitude of the anomaly.

5.0 RESULTS

5.1 Old Burn Area (Site 6)

Figure B-2 shows the geophysical survey grid established for the Old Burn Area. This grid was established to cover the entire Old Burn Area as delineated from previous investigations and historical aerial photographs. The survey grid was established on a 200-by-200-foot grid spacing using lathe stakes and flagging. The overall grid was 1,000 feet north-south and 2,200 feet east-west. For entry into the computer database, each grid was given an alphanumeric identification number.

Figure B-3 provides the combined results of the individual track maps in the form of a color contour map. Several target areas for buried materials were identified from the map. The majority of the anomalies are located in or near the revetment area. The anomalies in this area correspond well with disturbed areas identified by historical aerial photographs. Four of

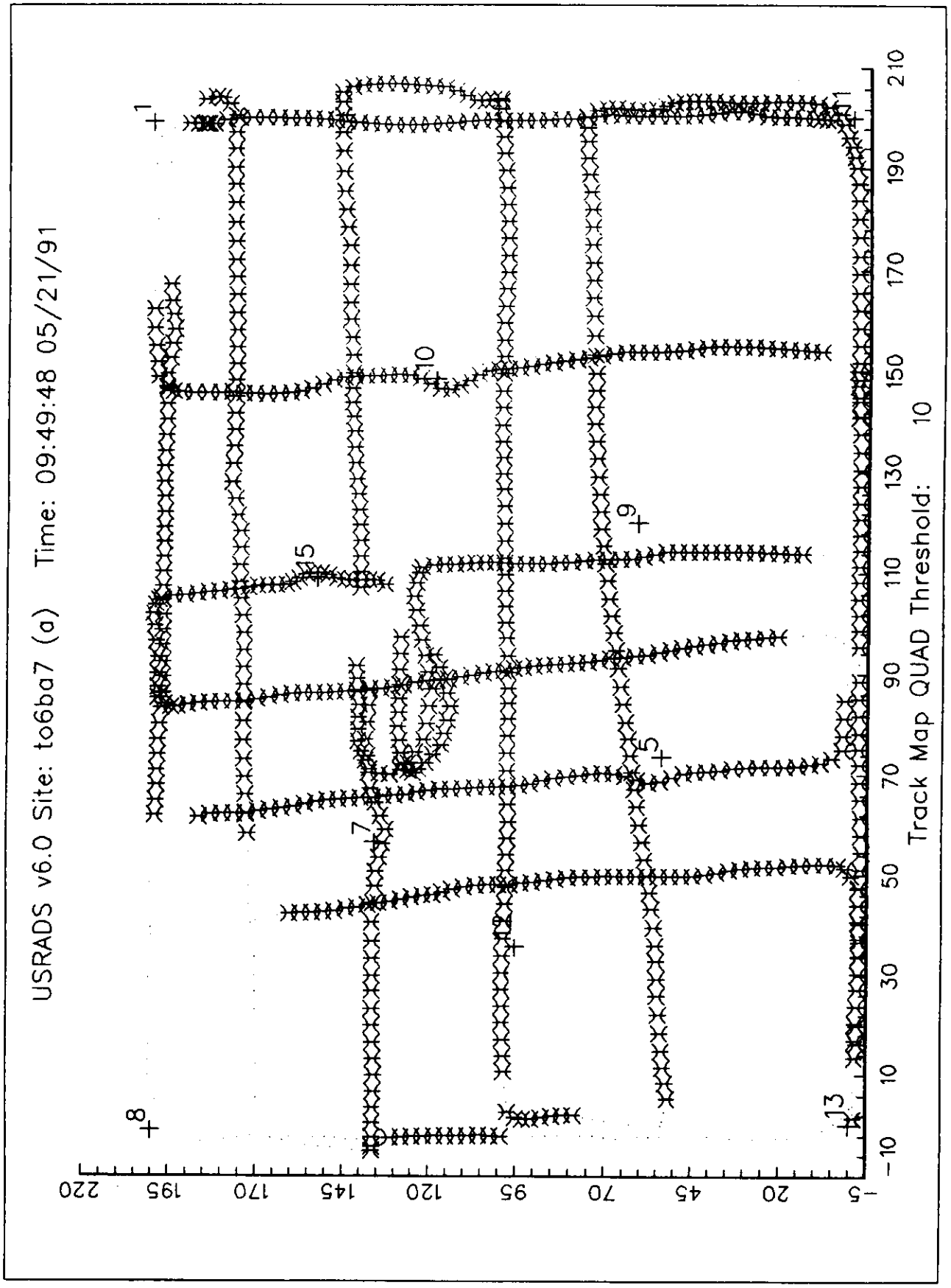


Figure B-1. Example Track Map

the anomalies were selected for test sampling and analysis. Anomalies associated with grids E-7 and E-8, D-8, D-9, and A-8 were selected for sampling and analysis (see Figures B-2 and B-3). An anomaly located in grid B-3 was selected for an exploratory test pit (no samples collected).

5.2 OLD BURN STAGING AREA (Site 35)

The gravel pit at the Old Burn Staging Area was surveyed to determine if any buried materials or evidence of former trenching was present. Figure B-4 shows the combined results of a geophysical survey conducted within the pit. The survey was conducted on a 20-foot survey grid. The results of the survey indicated no buried materials are present at the Old Burn Staging Area.

5.3 CHEMICAL RANGE (Site 7)

A 200-by-260-foot grid was established at the Chemical Range (Site 7). The survey was conducted on a 20-foot grid spacing and covered the area of the two former trenches and the suspected trench area previously identified by Weston (1990). The concrete building foundation is located in the southeastern portion of the survey area (Figure B-5). A strong anomaly located to the west of the building foundation was identified (Figure B-6). This anomaly supported the previous anomaly identified by Weston (1990). Less distinct geophysical anomalies are located to the north of the building foundation in the area of the former open trenches (Figure B-6). The three most prominent anomalies were selected for test pit sampling and analysis.

5.4 AED TEST RANGE (Site 40)

Figure B-7 shows the locations of revetments at the AED Test Range where geophysical surveys were conducted. These revetments, for the purpose of the surveys, were labeled revetments 1 through 6. Each of the surveys within revetments was conducted using a 20-foot grid spacing. Figure B-8 shows the combined data for revetment 1, which contains a drop tower. Because of an abundance of surface debris, the geophysical survey was somewhat ineffective. As a result, no specific target areas were identified. Figure B-9 shows the results of the geophysical survey for revetment 2. Although a very small anomaly is present, there was no indication of significant buried materials being present in this revetment. Revetment 3 (Figure B-10) contained an abundant amount of surface debris, including a concrete pad and wooden boxes containing empty canisters. No significant subsurface anomalies were identified within this revetment. Figure B-11 shows the results for revetment 4. Revetment 4 contained a large amount of surface debris, including large bomb casings. The blank area within Figure B-11 represents the area of surface debris. Because of the large amount of surface debris, the geophysical survey at this location was difficult to interpret. Results for revetment 5 are shown on Figure B-12. One target area for buried debris was identified by the geophysical survey. On the basis of this anomaly, a test pit for sampling and analysis was located in this revetment. Figure B-13 shows the results for revetment 6. One target area was identified by the survey in this revetment. On the basis of this target, a test pit for sampling and analysis was located within this anomaly.

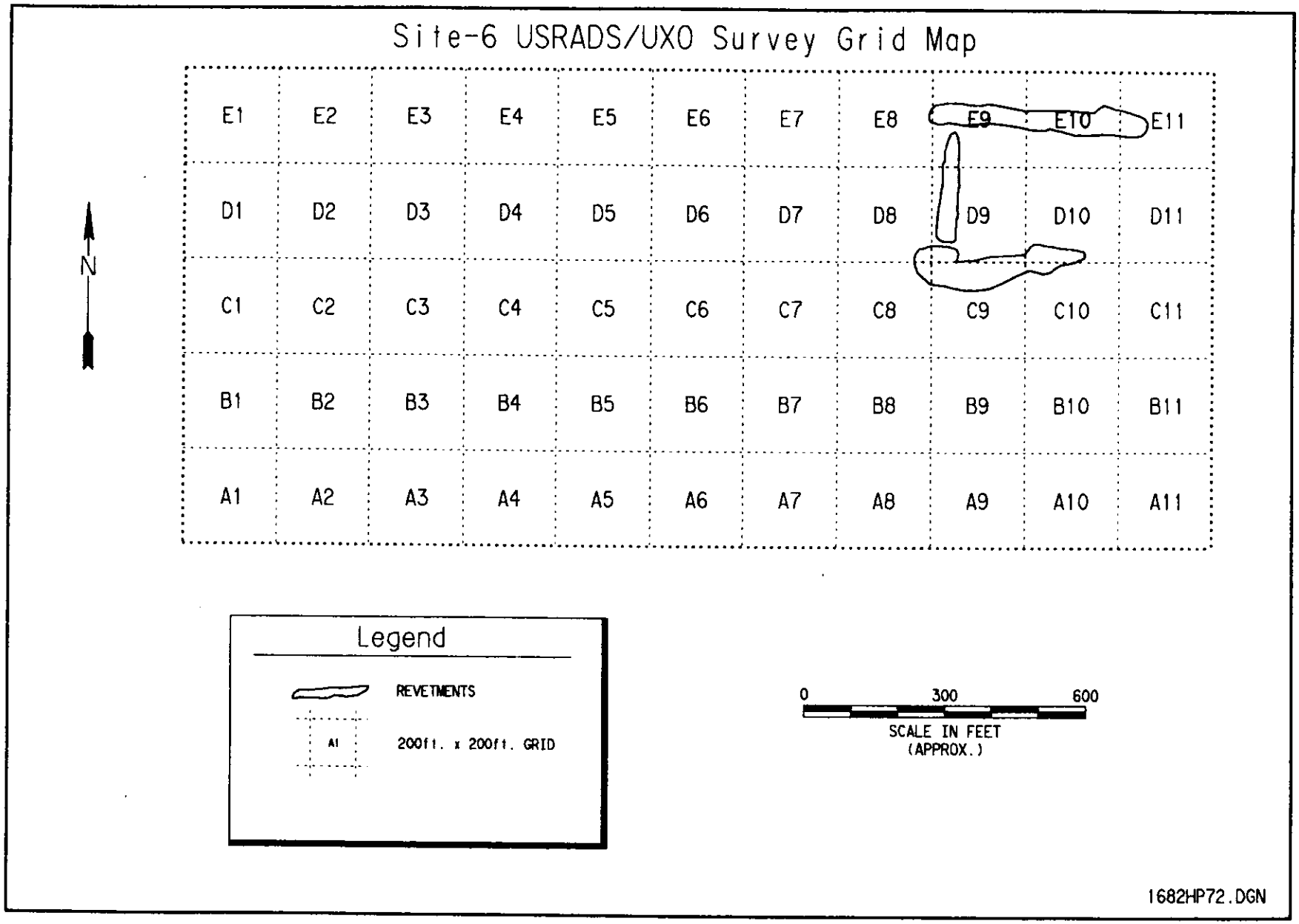


Figure B-2. Old Burn Area Geophysical Survey Grid

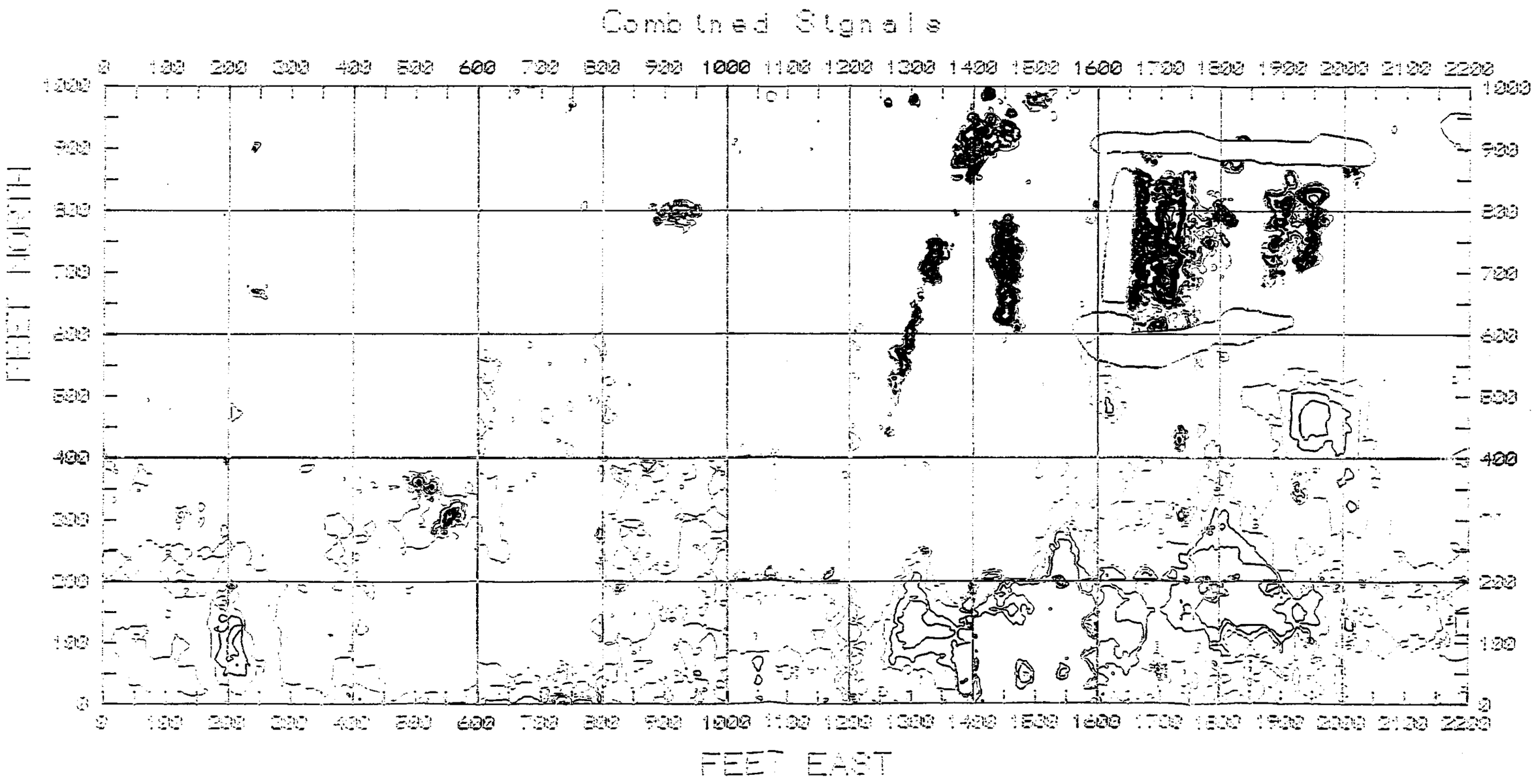


Figure B-3. Geophysical Survey Anomaly Map for the Old Burn Area (Site 6)

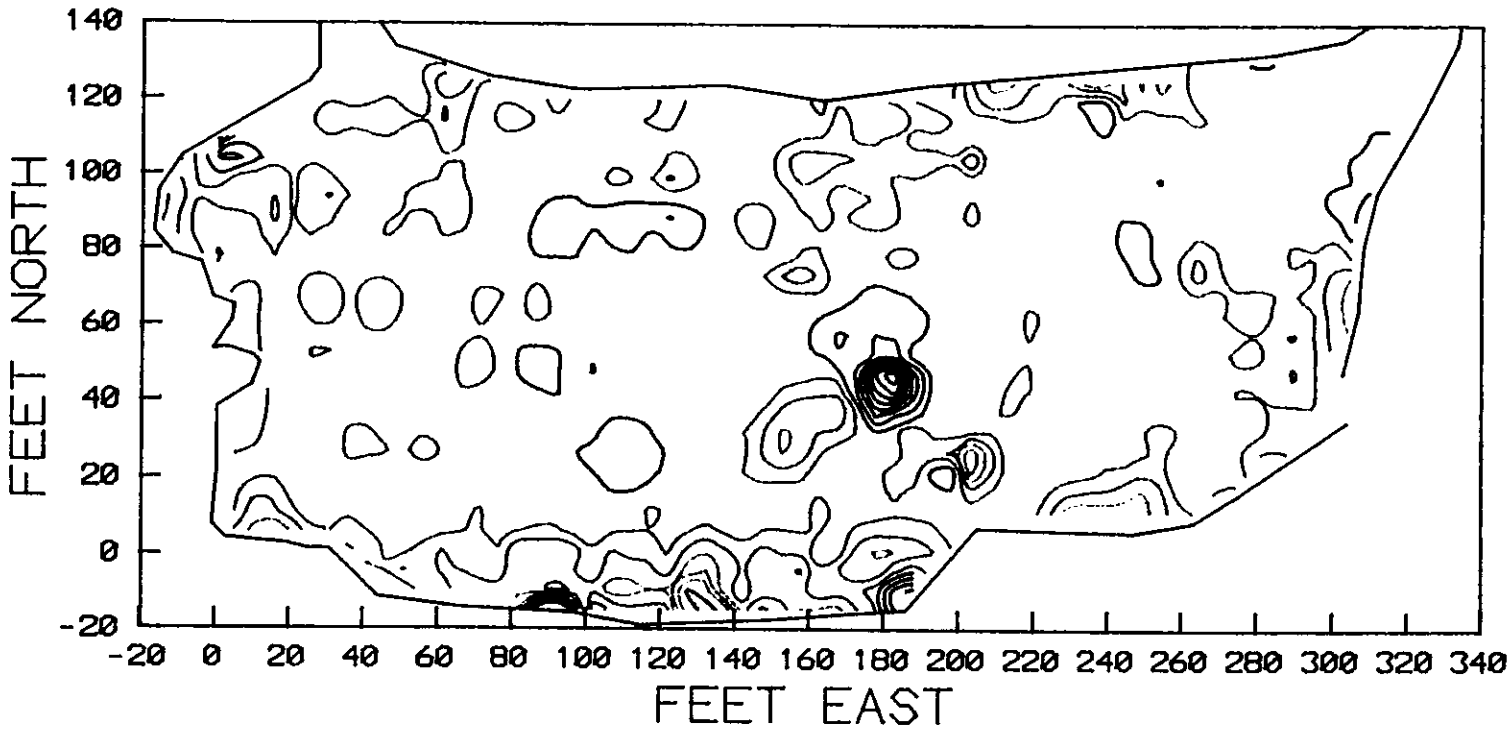


Figure B-4. Geophysical Survey Anomaly Map for the Old Burn Staging Area (Site 36)

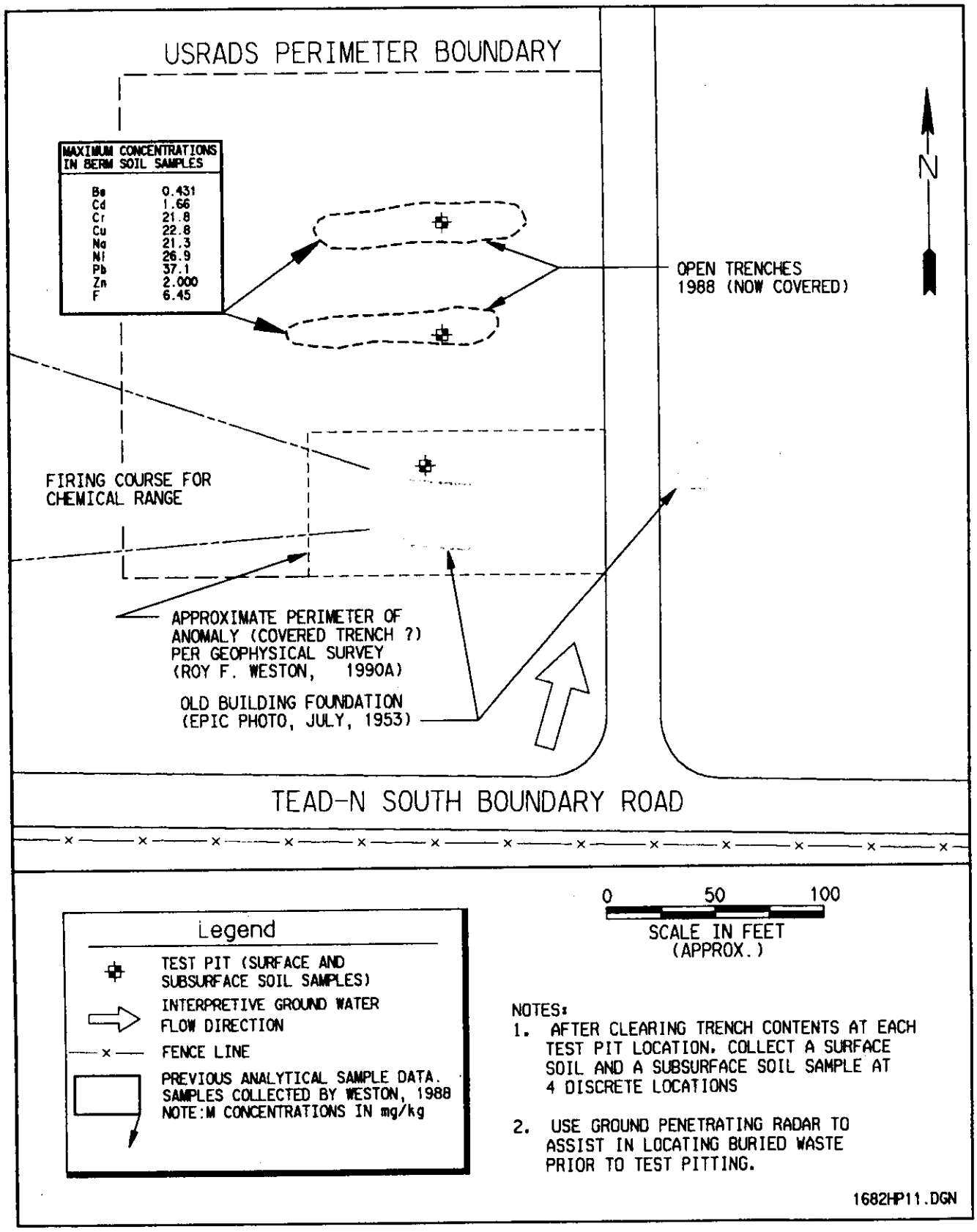


Figure B-5. Location Map of the Chemical Range (Site 7)

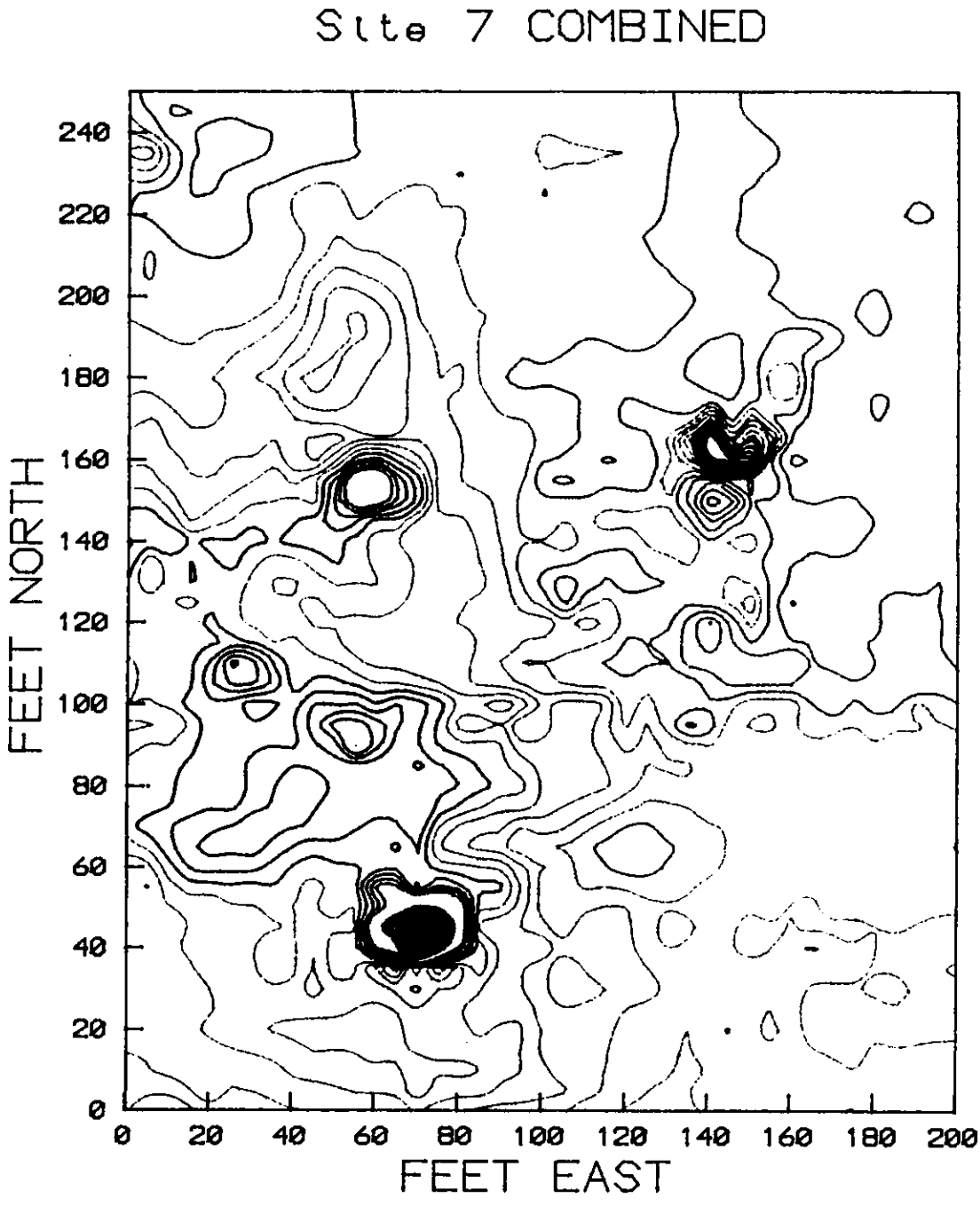


Figure B-6. Geophysical Survey Anomaly Map for the Chemical Range (Site 7)

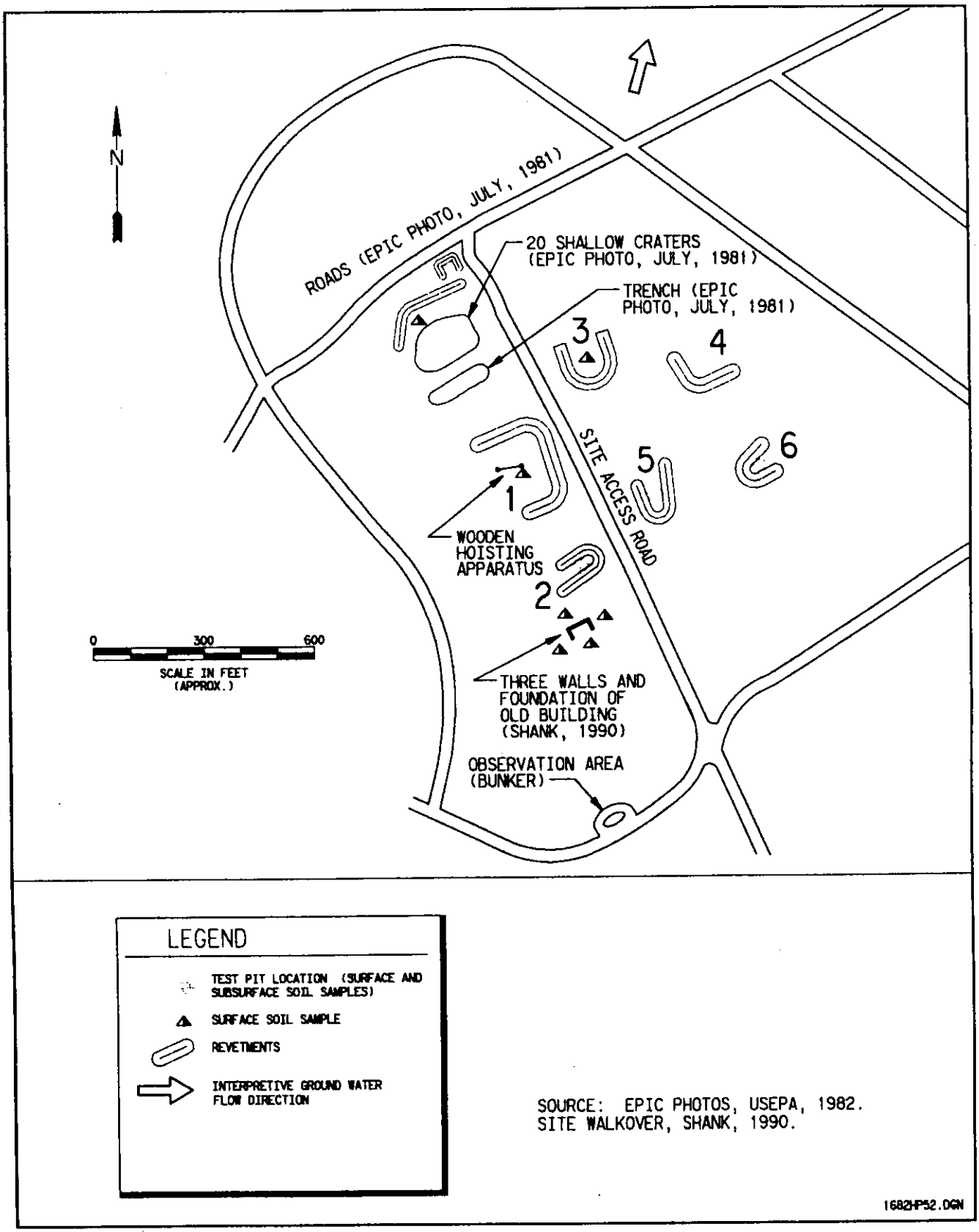


Figure B-7. Location Map of Revetments Surveyed at the AED Test Range (Site 40)

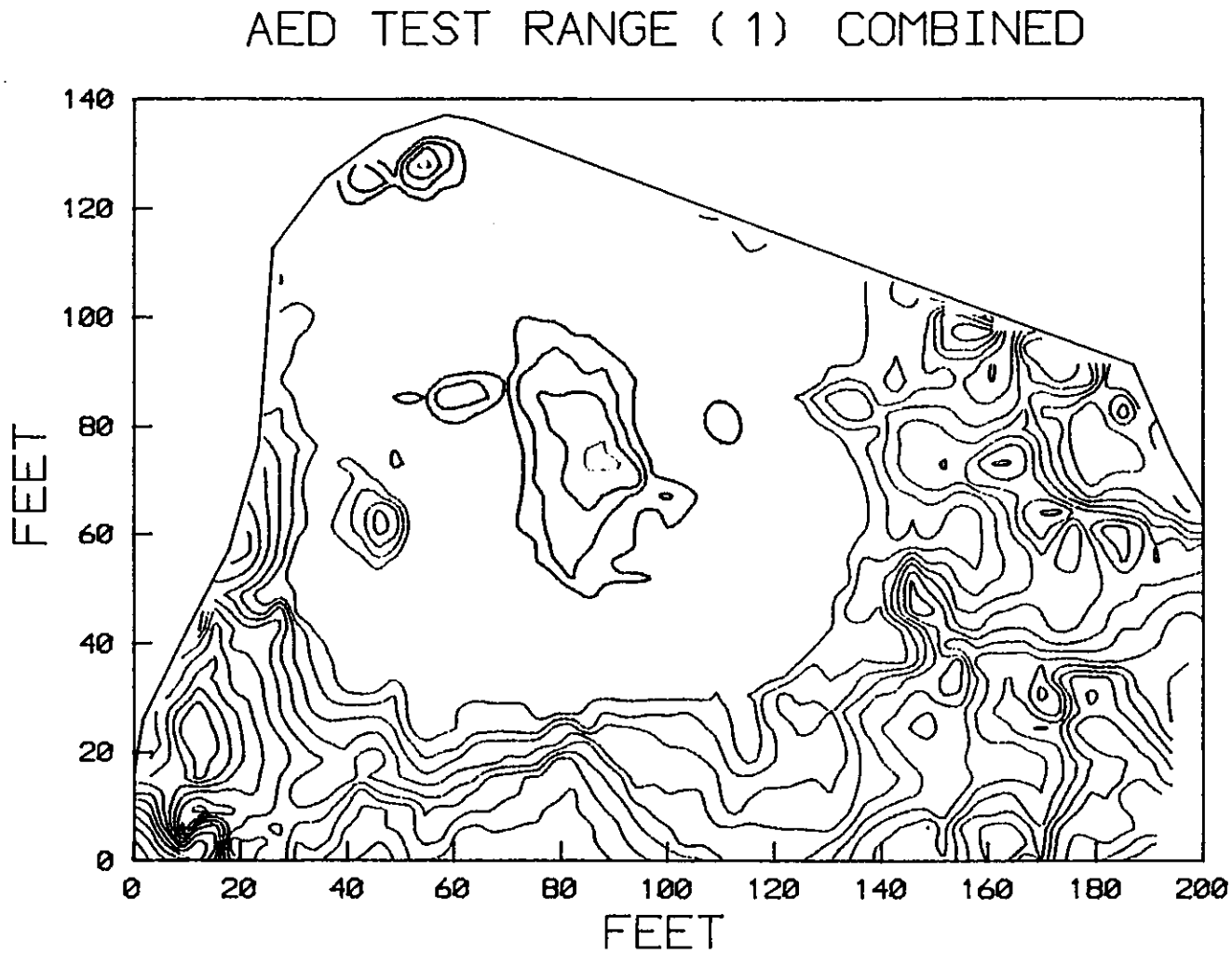


Figure B-8. Geophysical Survey Anomaly Map for Revetment 1 of the AED Test Range (Site 40)

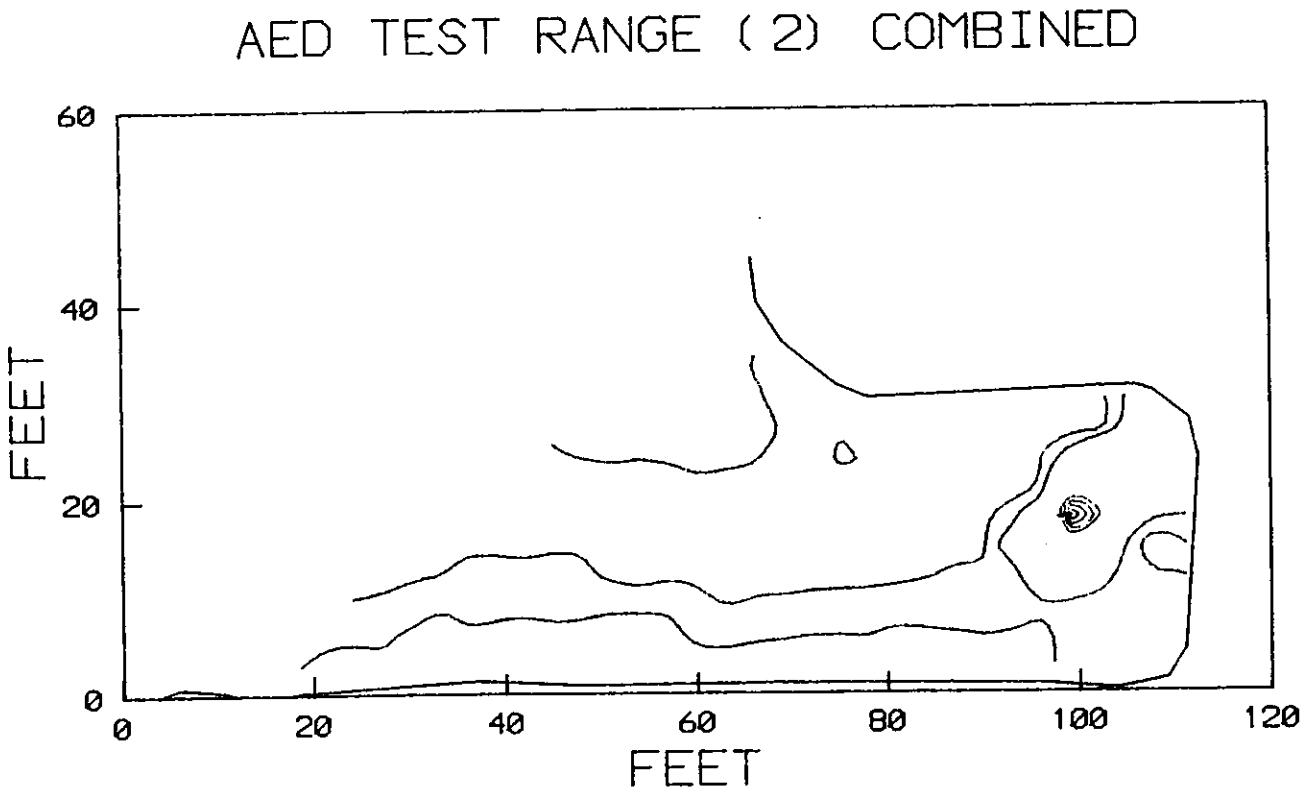


Figure B-9. Geophysical Survey Anomaly Map for Revetment 2 of the AED Test Range (Site 40)

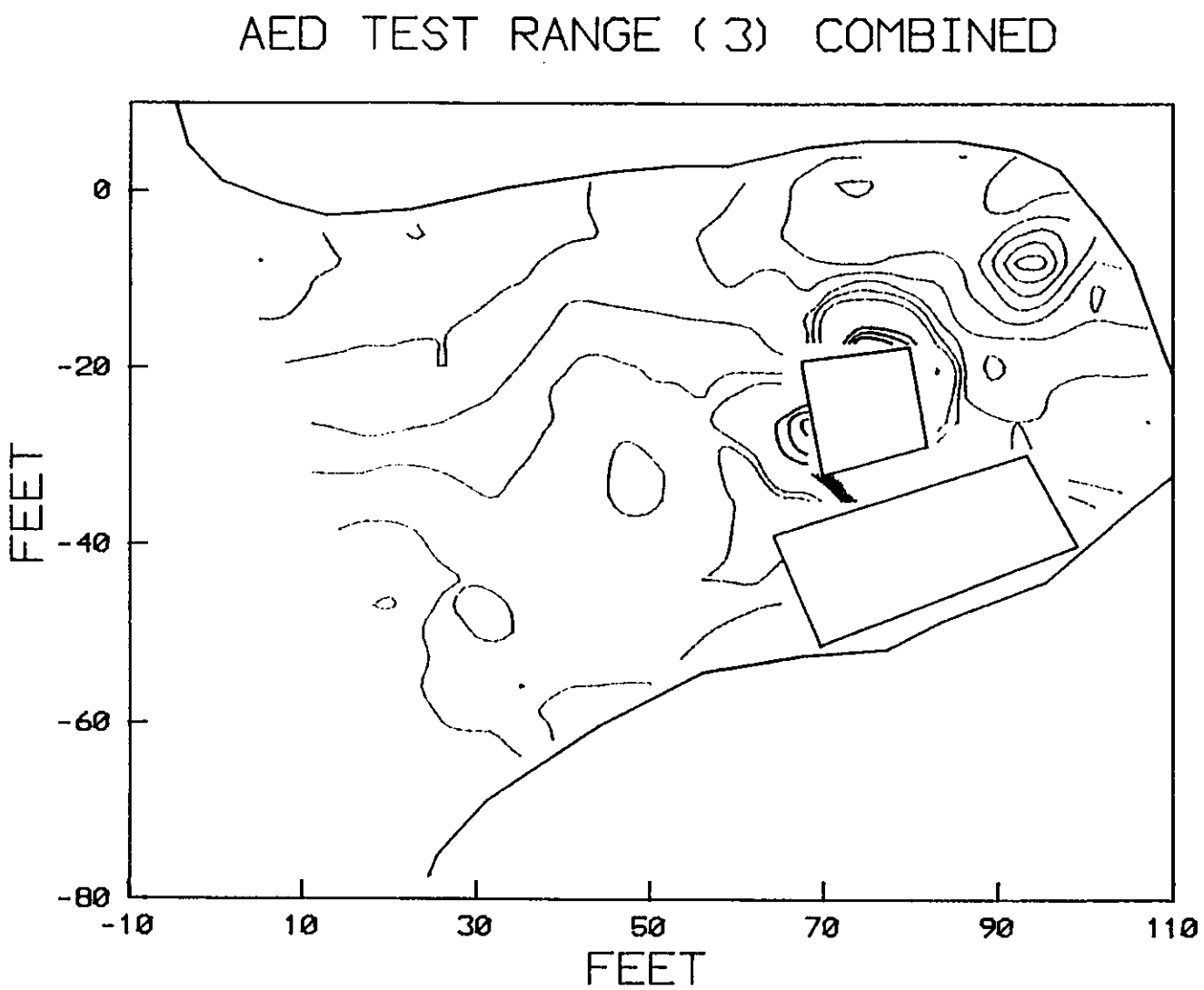


Figure B-10. Geophysical Survey Anomaly Map for Revetment 3 of the AED Test Range (Site 40)

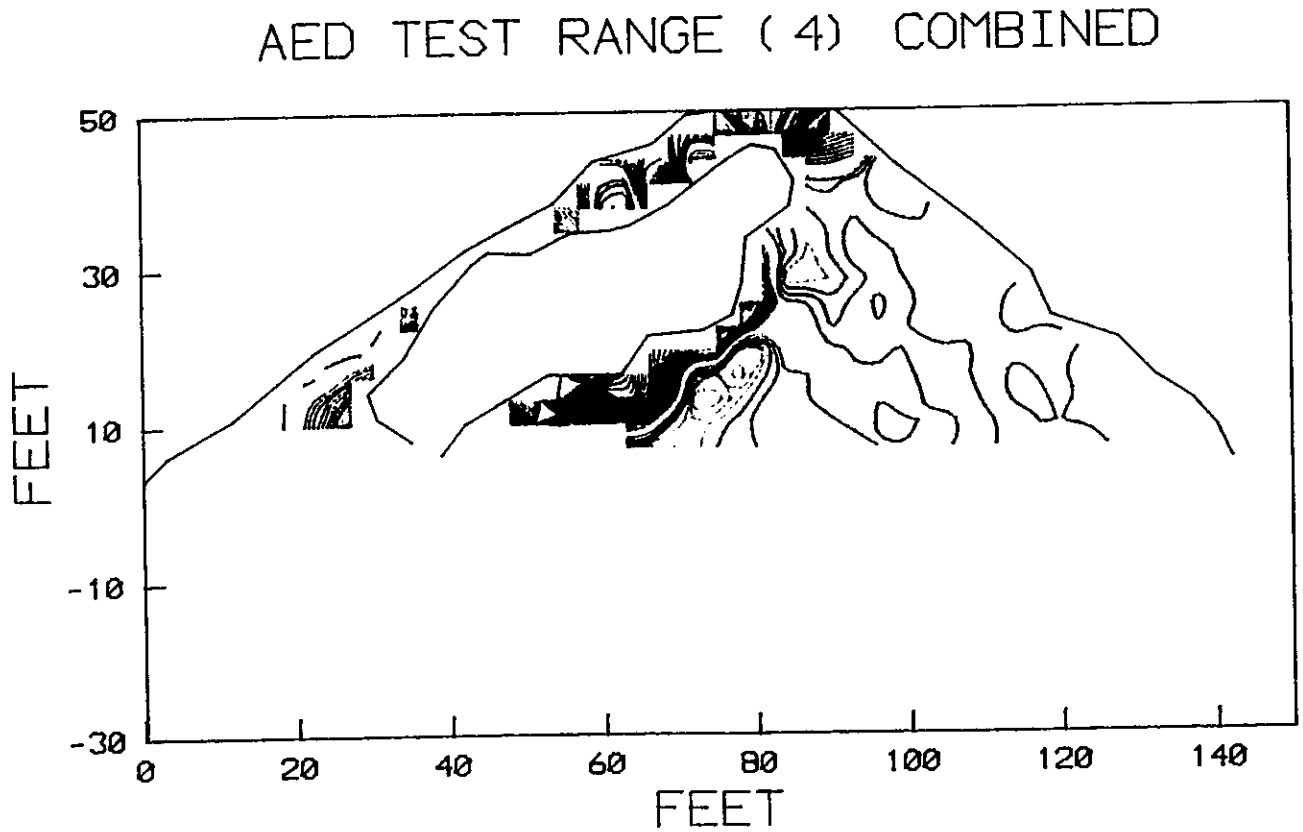


Figure B-11. Geophysical Survey Anomaly Map for Revetment 4 of the AED Test Range (Site 40)

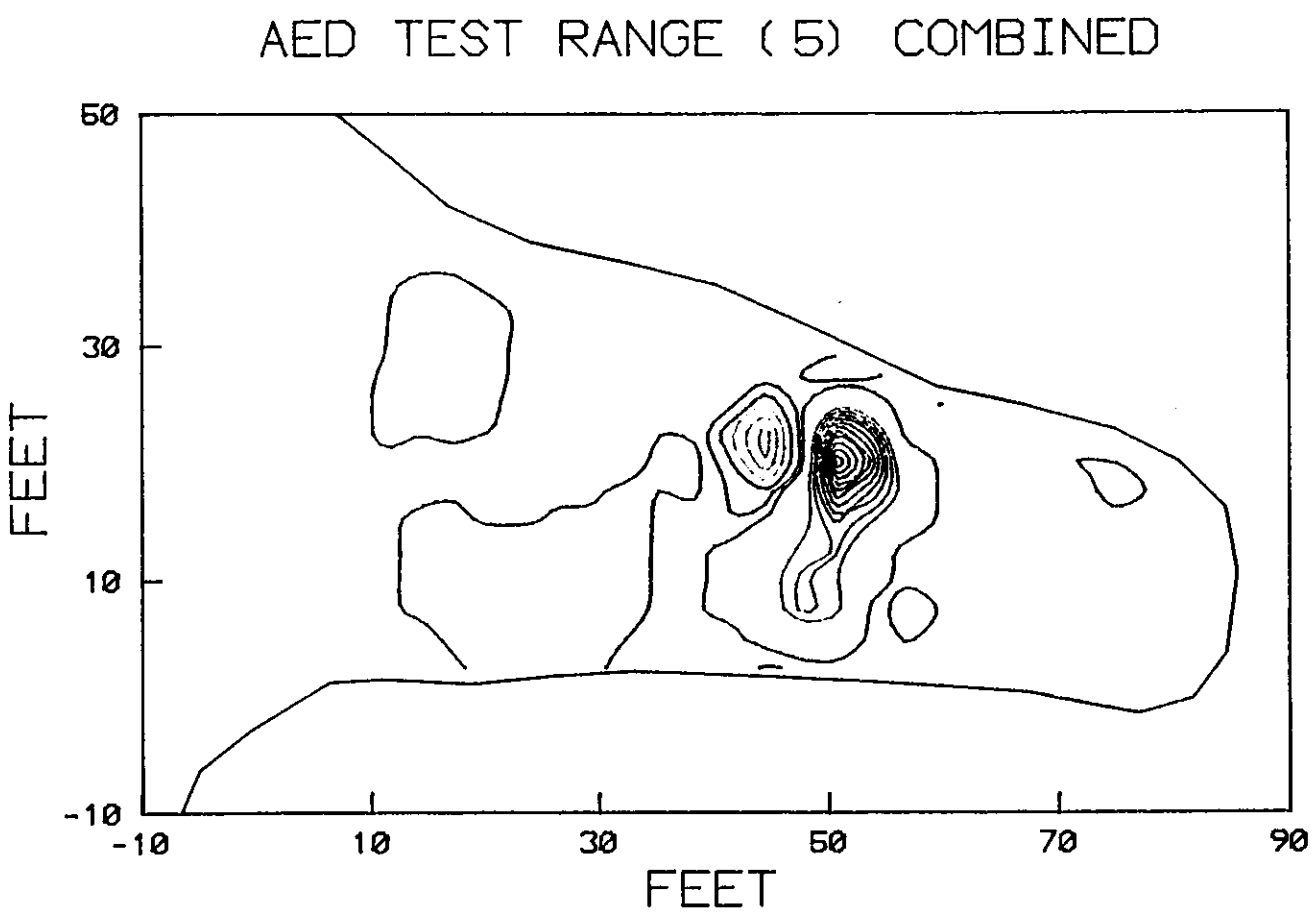


Figure B-12. Geophysical Survey Anomaly Map for Revetment 5 of the AED Test Range (Site 40)

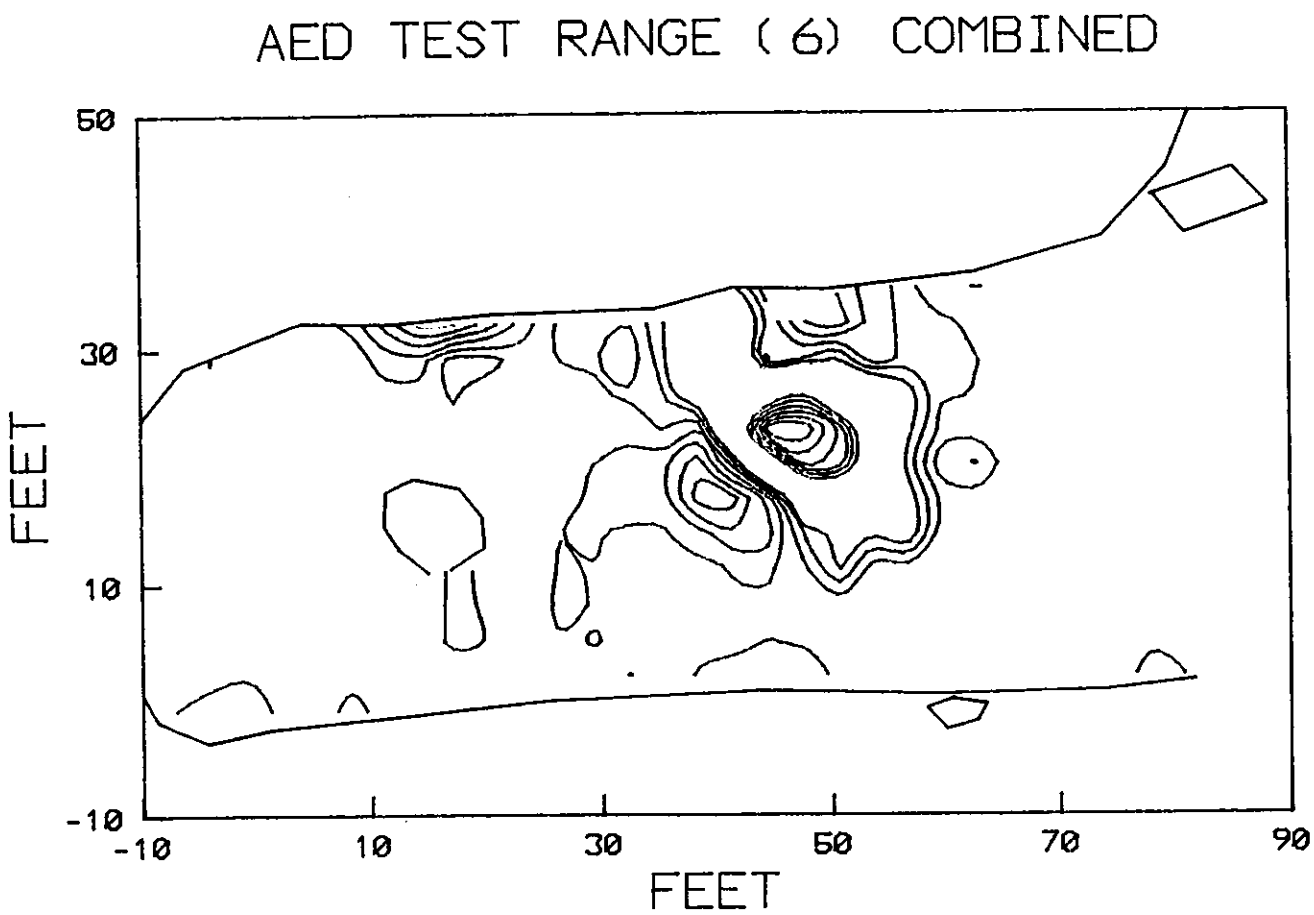


Figure B-13. Geophysical Survey Anomaly Map for Revetment 6 of the AED Test Range (Site 40)

APPENDIX C

TEST PIT LOGS

OLD BURN AREA

TEST PIT RECORD

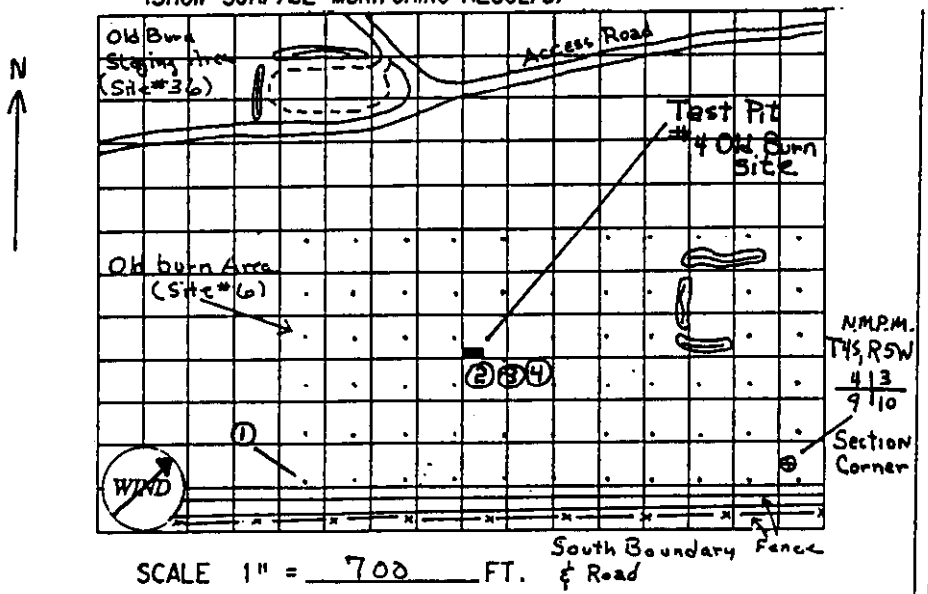
Area View of Test Pit - OBS-92-401 & OBP-92-401 thru 404 Page 1 of 3

SITE Old Burn Area Site / SWMU #6

TEST PIT Old Burn #4 DATE 6/20/92 TIME 0830 hrs END 1130 hrs

COORDINATES UTM = N4,483,308 E 380,406 GRID ELEMENT 175 ft X 175 ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgers
6. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll Roll #3 on John Burger Camera

Exposure #6, 7, 8, 9

NOTES:

(1) South boundary of the USRADS Grid map of the old burn area. The grid was established on 200 ft Centers

(2) This pit location was established on the basis of surface conditions. The USRADS map showed very minor anomaly characteristics. The ground surface showed a depression running in a North South direction and evidence of soil shearing on the East west boundaries of what appears to be a trench.

(3) The Coordinates for this pit are based on the approximate center point of the pit, both length wise, and width wise.

(4) There appears to be metal banding, burned and unburned wood debris, and some small arms cartridges that have been burned. From 1 to 3 ft the contamination seems to be mainly burned and unburned wood. From about 3ft to 6ft, where the contamination ends, metal materials are present. There is no visable contamination deeper than 6.0ft

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

Profile Along Test Pit - OBS-92-401 & OBP-92-401 thru 404 Page 2 of 3

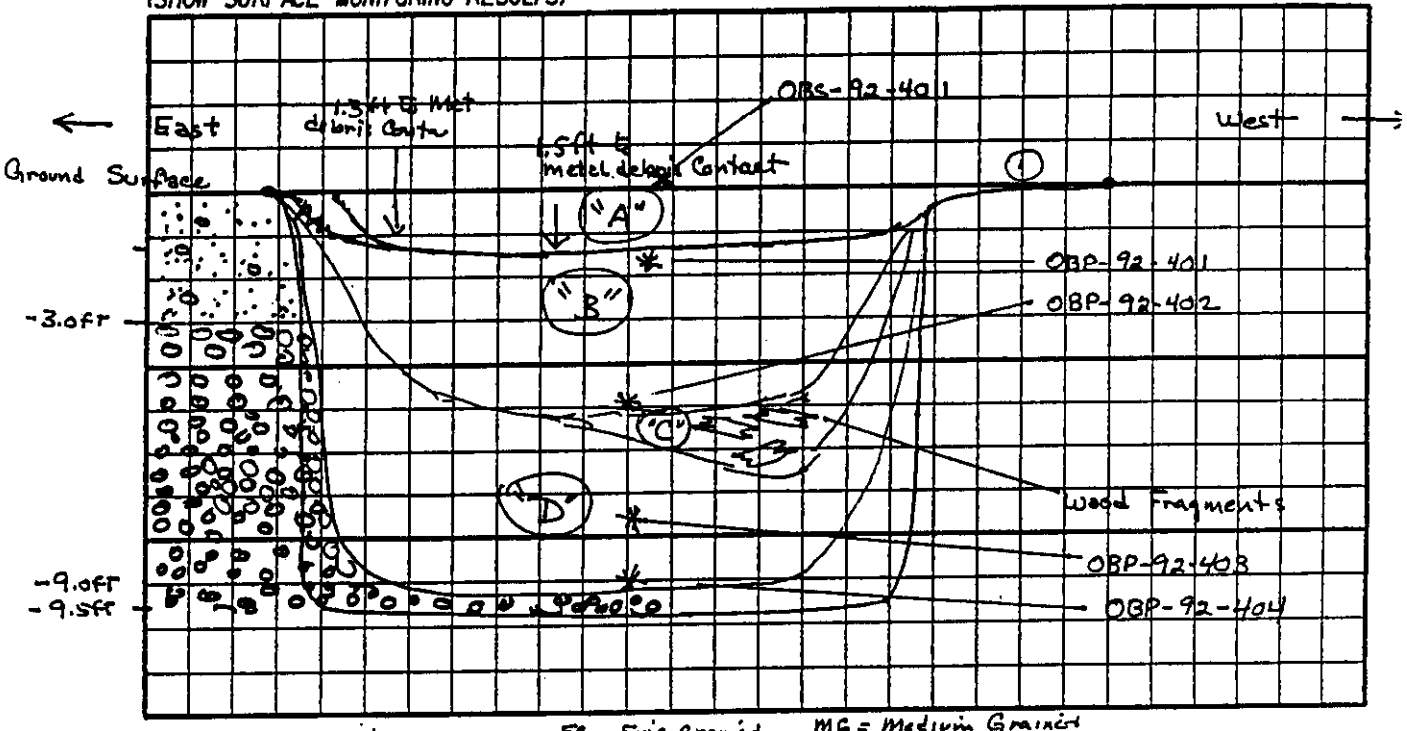
SITE Old Burn Area Site/SWMU #6

TEST PIT Old Burn #4 DATE 6/20/92 TIME 0830 hrs END 1130 hrs

COORDINATES UTM = N-4,483,308 ; E-380,406 GRID ELEMENT 1.0ft X 1.0ft

① Test pit dimensions are 19ft length X 3.5ft width X 9.5ft depth. and Test Pit Coordinates are Based on OBS-92-40 samble Take from center of Pit profile

SKETCH OF TEST PIT CROSS SECTION (SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.

DEPTH (FT.)

Natural formation

NOTES: Natural formation outside of filled trench =

Pebbly FG Sands, matrix Supported, Calcareous Sands, Clast (10-20%) Composed of 90-95% ≈1" dia WR Quartzite 5-10 Blck micritic Ls

= Medium Grained Clast Supported well rounded Quartzite pebble Conglomerate with Caliche Cement

Filled Materials

"A" MG pebble slightly Silty FG Sand with burned wooden debris throughout (25-30 Clasts) Color = 10YR-5/3 - Calcareous Sand Clast=90-95% Quartzite 5-10% Blk micritic Ls

"B" Some description as "A" region except there is some metal banding debris in material

"C" Wood debris 4.7ft - 6.5ft about 7.0 ft from west end of Pit

"D" FG Sand, Med Size Pebble Gravel, Color=2.5Y-4/3 ~~1682FR01.DGN~~ Calcareous Sands Clasts = ~~Mostly~~ 90-95% WR Quartzite 5-10% Blk Micritic Ls Considerable wood / metal Banding debris

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP (VOA) PPM
S-1	Surface	OBS-92 401	Negative
S-2	2.5'	OBP-92 401	Negative
S-3	5.0'	OBP-92 402	Negative
S-4	7.5'	OBP-92 403	Negative
S-5	9.0'	OBP-92 404	Negative
S-6			
S-7			
S-8			

REFERENCE: #6 Field Book, Pg. 37, 38

Attachments #1

SIGNATURE [signature]

TEST PIT PROFILE RECORD

REMEDIAL INVESTIGATION FIELD SAMPLING PLAN

TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Old Burn Area Site/SWMU #6

Page 3 of 3

Test Pit #4

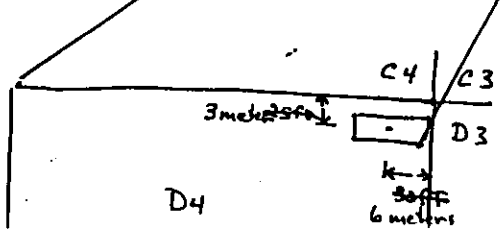
Section Corner 4|3 / 9|10 T4S R5W

USRAD Grid Map

Signature

Southern Boundary of Grid

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1
D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1



N

Test pit #4 Old Burn. Coordinates are at OBS-92#01 OBP-92-401 thru 404

Bearing = Due East to West

UTM = N 4,483,3~~77~~ m

E 380,404 m

C-7

TEST PIT RECORD

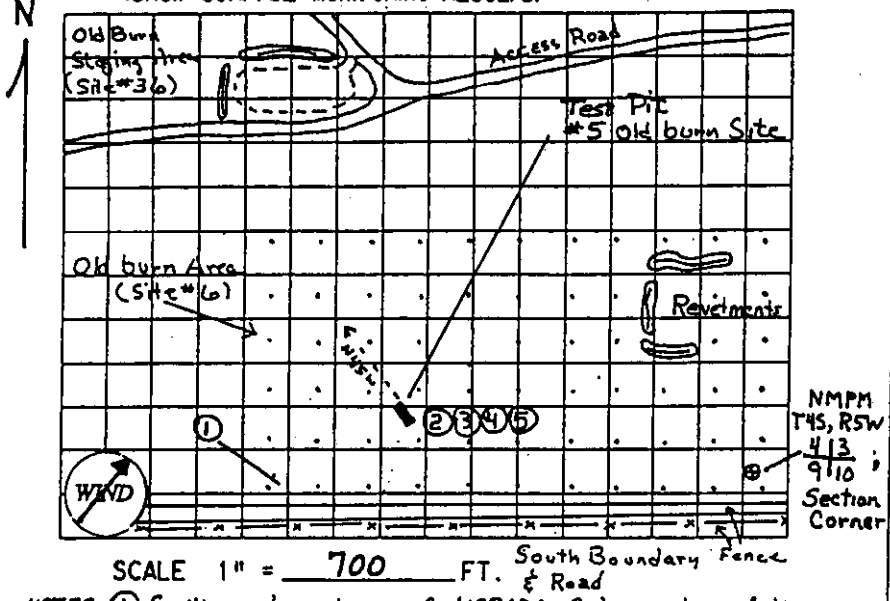
Area View of Test Pit - Observation trench/No Samples Page 1 of 3

SITE Old Burn Area Site #6

TEST PIT Old Burn #5 DATE 6/20/92 TIME 1230 hrs END 1400 hrs

COORDINATES UTM = N4,483,215 E380,387 m (3) GRID ELEMENT 175 ft X 175 ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

NOTES: (1) Southern boundary of USRADS Grid Map of the old burn area. The grid was established on 200ft. Centers

(2) Test Pit old burn #5 is based on the Anomaly's noted on the USRADS Survey MAP. No sample will be taken if contamination is not seen. Gerald Minor and Daniel Sprouse from the Directorate of Ammunition did say, when they were out that smoke canisters may have been burned in this Area.

(3) The Coordinates for the pit are based on the approx. center point of the pit, both length wise and width wise.

(4) No visible contamination was observable in the pit, therefore no samples were taken

(5) Demensions of the pit are 14.0 ft length X 3.5 ft width X 7.0 ft depth

CREW MEMBERS:

1. Douglas D Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgens
6. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll N/A
No Pictures Taken, No Contamination Apparent.
Exposure N/A

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

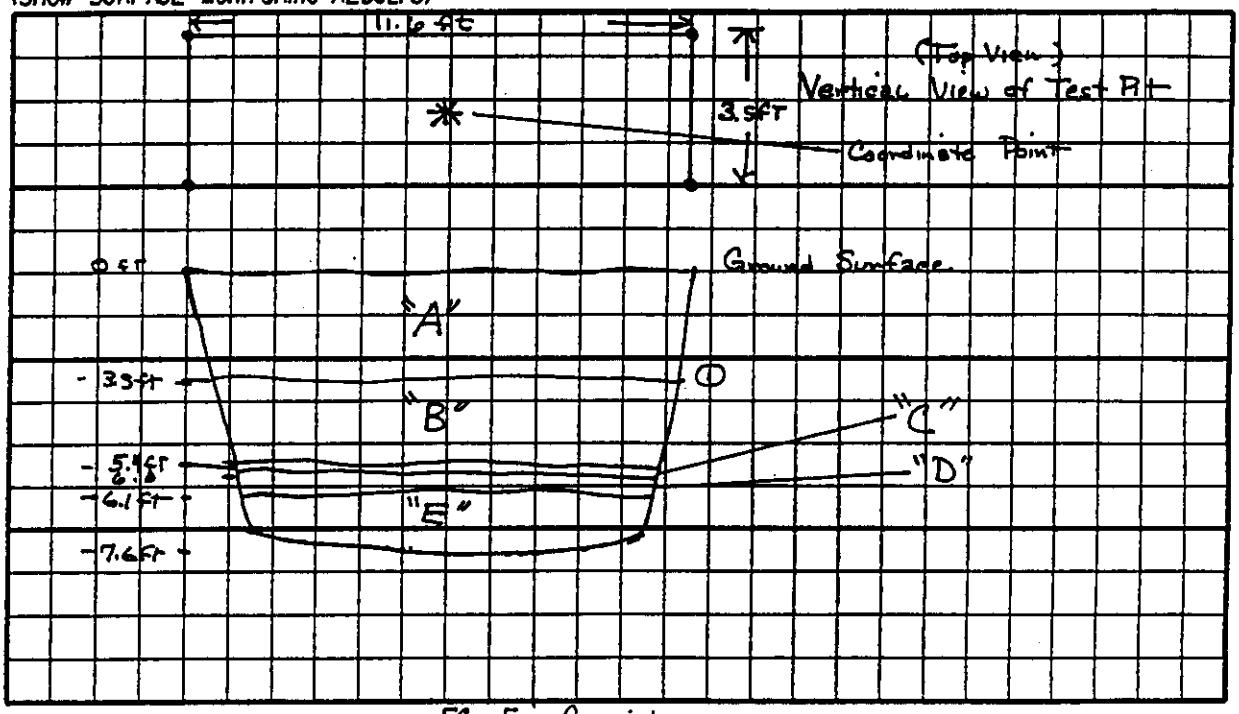
Profile Along Test Pit - Observation Pit only / No Samples Page 2 of 3

SITE Old Burn Area Site / SWMU #6

TEST PIT Old Burn #5 DATE 6-20-92 TIME 1230 hrs END 1400 hrs

COORDINATES UTM = N 4,483,215 E 380,387 GRID ELEMENT 1.0 ft X 1.0 FT

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = _____ FT.
DEPTH (FT.)

FG = Fine Grained
WR = Well Rounded
MG = Med. Grained
Ls = Limestone
VFG = Very Fine Grained

NOTES: ① Horizontal bedding

"A") slightly pebbly FG Sand
Color = 2.5 Y 5/3 Light Olive brown
Matrix Supported : Calcareous Matrix
Clasts: WR, MG, (≈1" dia)
90-95% Quartzite
5-10% Blk Micritic Ls

"B") Sandy med Grained Pebble gravel
Color = 10YR 6/4 Light yellowish brown
Matrix (30-40%) FG & VFG calcareous Sand
Clasts (60-70%) med grained, WR, 90-95% Quartzite and 5-10% Black Micritic Ls

"C") Same description as "B" Except Limonite Staining

"D") Same as "B" Zone

"E") Sly Pebbly Silty, Clay - Pebbles 5% = MG WR Quartzite
Color = 10YR 5/2, Yellowish Brown

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	No Samples Taken - Neg -		
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: #6 Field Book, Pg. 37, 38

Attachments #1

SIGNATURE: Douglas D. McKay

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

OLD BURN AREA Site/SWMU #6

Page 3 of 3

Test Pit #5

Observation Pit only - No Samples

Signature _____

Section Corner 4/3 9/10 T4S R5W

USRAD Grid Map

Southern Boundary of Grid

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1
D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1

11/45 = 13.6 m ≈ 14m

N

(14m) 44' → ← (29m) 95'

B3

200 ft

Old Burn Test Pit #5 coordinates are centered with in the Pit dement

Bearing N 45° W

UTM = N 4,483,215 m
E 380,387 m

TEST PIT RECORD

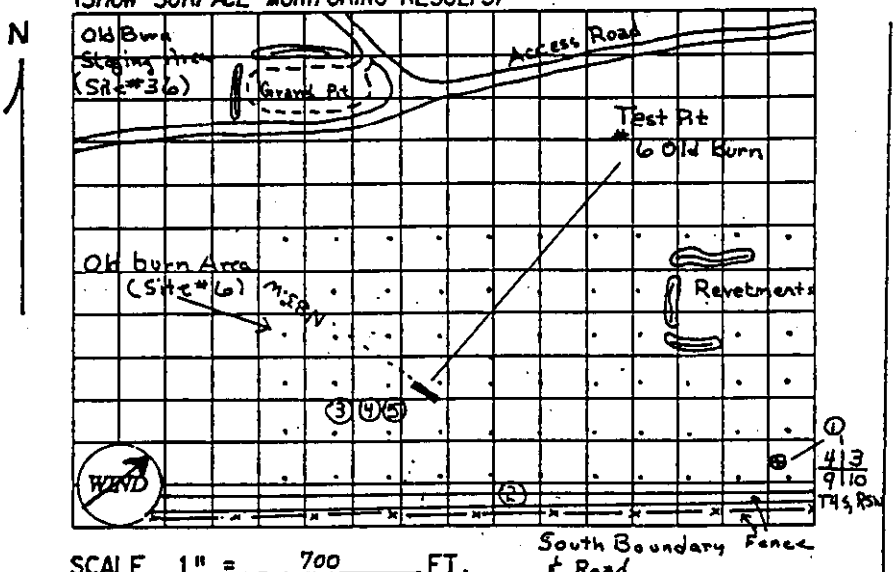
Area View of Test Pit - Observation Pit / No samples taken Page 1 of 3

SITE Old Burn Area Site / SWMU #6

TEST PIT Old Burn #6 (OB6) DATE 6-20-92 TIME 1400 hrs END 1500 hrs

COORDINATES UTM - N-4,483,231 E 380,374 GRID ELEMENT 175 Ft. X 175 Ft.

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgers
6. Michael Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll N/A

Exposure N/A

FG = Fine grained
WR = Well Rounded
Ls = Limestone
Calc = Calcareous

NOTES: (1) This section Corner is Located in the 11th Row from west to East. The Row width on the grid is 177.3 ft All other rows are 200ft

(2) The Southern Boundary is East West Lying and the USRAD Grid, which is is the South Boundary is Layed out on 200ft x 200ft Grids except for the most Easterly grid Row which is 177.3ft

(3) This test pit is based on Anomalies from the USRADS Grid Map, and based on conversations held with Daniel Sproule and Gerald Minor of the Directorate of Ammunitions while digging test pit #2. They felt that smoke grenades had been burned in this vicinity at one time.

(4) No visable Contamination was present in this pit. Therefore No Samples or pictures were taken

(5) Demensions of Pit are 16.5ft Length X 3.5ft Width X 7.0 ft depth

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

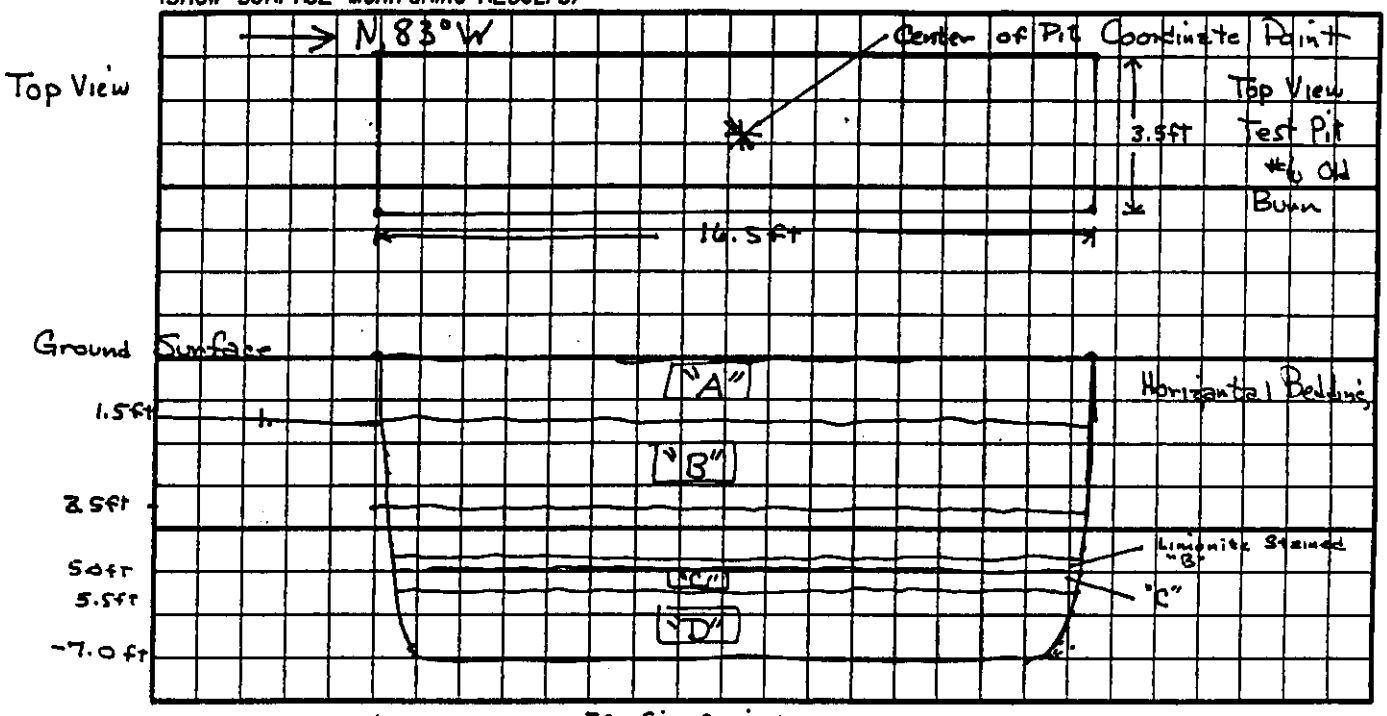
Profile Along Test Pit – Observation Pit / No Sample Taken

SITE Old Burn Area Site / SWMU #6

TEST PIT Old burn #6 DATE 6-20-92 TIME 1400 hrs END 1500 hrs

COORDINATES UTM = N4,483,231 E380,374 GRID ELEMENT 1.0 ft X 1.0 ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT. FG = fine grained
DEPTH (FT.)

NOTES:

[A] 0-1.5ft = Pebbly FG Sand
Clasts 10-20%
¾" WR Quartzite 90-95%
¾" WR Black Micritic Ls
Matrix = Calc sub Angular FG Sand
Color: 2.5 Y 5/3 Light Olive brown

[B] 1.5-5.0ft Normal graded ~~gravelly~~ pebbly Sand
Clasts (40-50%)
Size: med Cobble – med pebble
Composition 90-95% Quartzite
5-10% Blk Micritic Ls
Matrix (40-50%) Calc. Sub Angular moist Fine grained Sand
Color = 10 YR 6/4 light Yellowish brown

[C] 5.0-5.5ft Small pebble sandy gravel
Clasts (60-70%) 5m WR Pebbles
Composition: 90-95% WR Quartzite
5-10% WR Blk Micritic Ls
Matrix (30-40%) Calc. Sub Angular Sand
Color 10YR 6/4 Light yellowish brown

[D] Slightly pebbly silty Clay
Clast (<5%) – Composition (SAME AS "C")
matrix: silty clay

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	N/A	N/A	Negative
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: 6 Field Book, Pg. 37, 38

Attachments #1

SIGNATURE: [signature]

~~1602FR01.DGN~~

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Old Burn Area Site/SWMU # 6

Page 3 of 3

Test Pit # 6

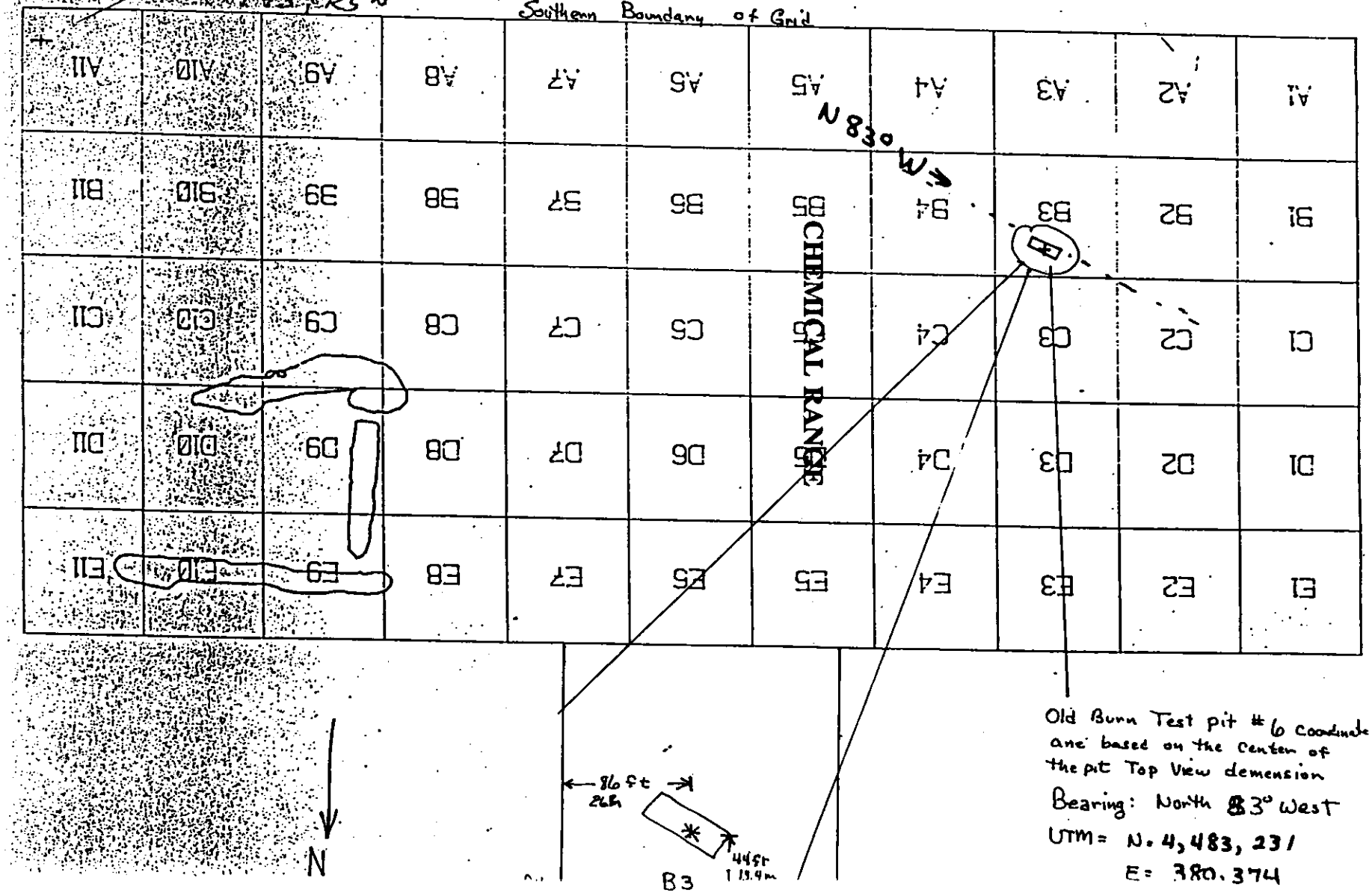
Observation Pit Only - No Samples taken

USRAD Grid Map

Signature _____

Section Corner 4/3 9/10 T 7 S, R 5 W

Southern Boundary of Grid



Old Burn Test pit # 6 Coordinate are based on the center of the pit Top View demension

Bearing: North 83° West

UTM = N. 4,483,231

E = 380.374

TEST PIT RECORD

Area View of Test Pit- Old Burn #2 Page 1 of 3

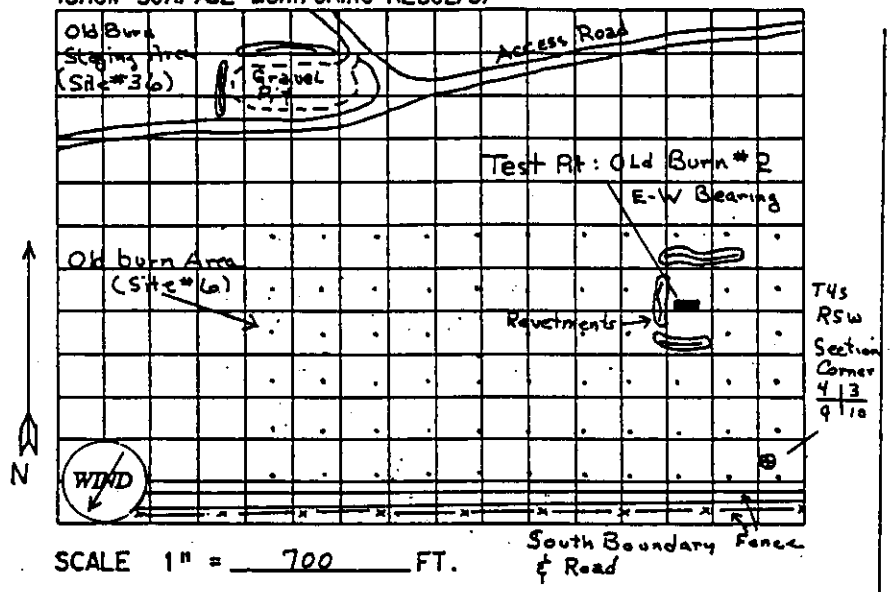
SITE Old Burn Area Site/Swmu #6

TEST PIT Old Burn #2 DATE 6-18-92 TIME 0830 hrs END 1500 hrs

COORDINATES TBD (2) GRID ELEMENT 175 ft X 175 ft

UTM = N 4,483,349 E 380 725

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Kristin Harms
4. Sydney Rogers.
5. Micheal Smerling
6. Harry Williams
7. Ralph J. Smith

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)
Other		

Photographs, Roll Pictures Taken by Harry Williams

Exposure N/A

NOTES: (1) This is the South Boundary of the USRADS 200 ft Squares Grid pattern

(2) TBD - To be determined This will be done when enough data has been gathered

(3) Bearing of the trench is due East-West, and its demensions are 17.0 ft Length X 4.5 ft Width X 10.6 ft depth

(4) The coordinate point for the trench is 12 ft from West end of pit and centered on the width demension

(5) Old Burn Staging Area gravel pit

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

Profile Along Test Pit- OBP-92-201 thru 204 Page 2 of 3

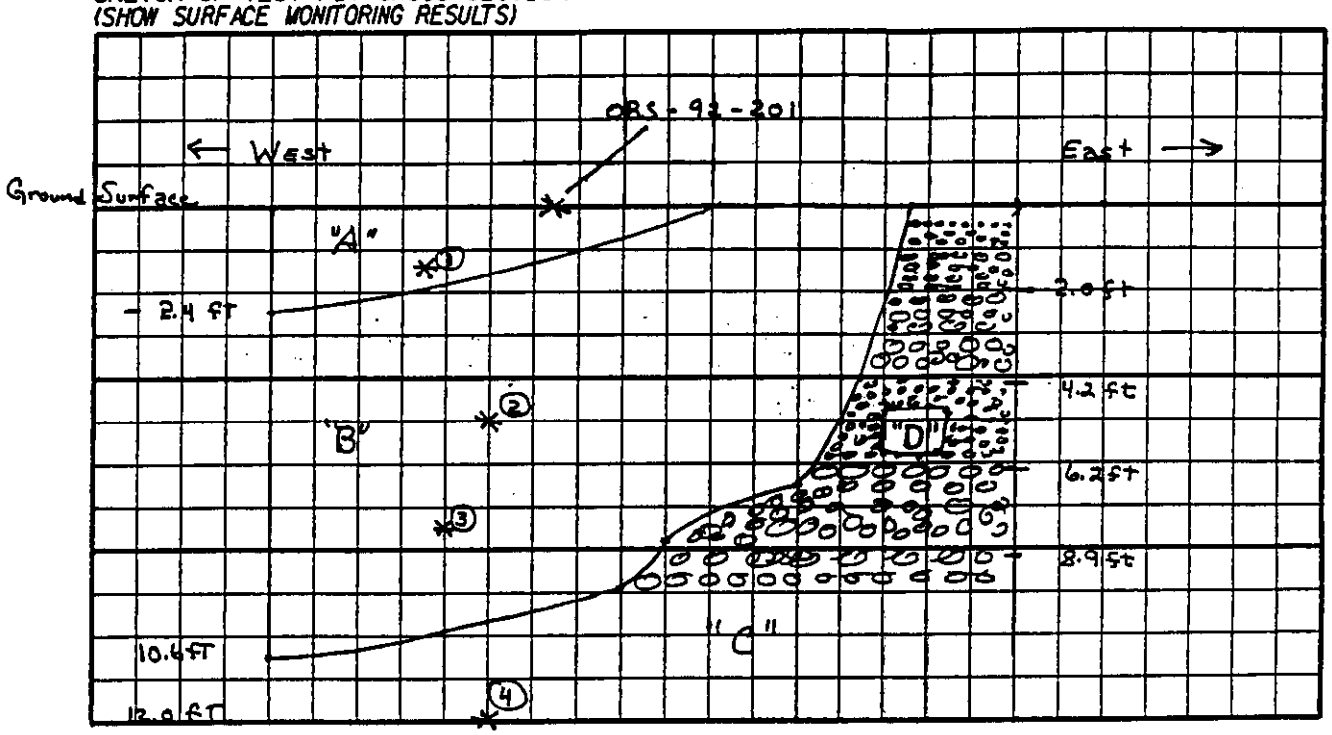
SITE Old Burn Area Site #6

TEST PIT #2 OB Burn Area DATE 6-18-92 TIME 0830 hrs END 1500 hrs

COORDINATES TBD ② of pg 1 GRID ELEMENT

UTM = N4,483,349 E 380,725

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT. (Horizontal)
DEPTH (FT.) 1" = 4.0 ft (vertical)

NOTES: ① Sample OBP-92-201 ② Sample OBP-92-202
③ Sample OBP-92-203 ④ Sample OBP-92-204

"A") Mostly very fine to fine grained sand, some medium to coarse sand, little sub-rounded quartzite pebbles, dry calcareous soils 10YR 4/3

"B") Mostly very fine to fine Sand, some subrounded quartzite pebbles, little medium to coarse sand, moist soil, is calcareous. Pebbles contain some limestone. Color= 7.5YR 5/3

"C") Color 10YR 5/3. Dry mostly clay, some silt some sub rounded quartzite pebbles

"D") Mostly fine sand, some silt with Sub-rounded quartzite pebbles. Various layers of normal graded Pebbles visable.

"B") Cont. This soil contains metal Banding, wire, metal and charcoal and charred wood debris.

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	OBS-92-201	< 1.0
S-2	5.0'	OBP-92-201	< 1.0
S-3	7.5'	OBP-92-203	< 1.0
S-4	12.0'	OBP-92-204	< 1.0
S-5	2.0	OBP-92-202	< 1.0
S-6			
S-7			
S-8			

REFERENCE: #6 Field Book, Pg. 32, 33, 34

Attachments #1,

SIGNATURE:

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Old Burn Area Site/SWMU #6

6/18/92

PM 4/3

Test Pit #2

Signature _____

Section Corner 4 | 3 / 9 | 10 T4S, R5W

Southern Boundary of Grid

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1
D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1

Test Pit #2 Old Burn

1346 ft

N

Coordinates For Center of Trench

Sample OBS-92-201

OBP-92-201 thru 204

UTM = N 4,483,349
E 380,725

TEST PIT RECORD

Area View of Test Pit- OBP-92-101 thru 104 Page 1 of 3

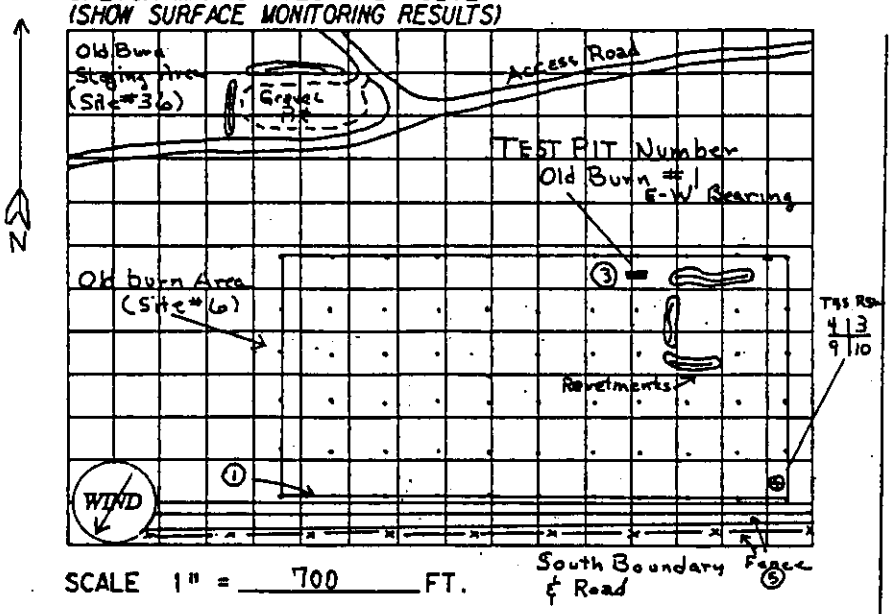
SITE Old Burn Area Site/SWMU #6

TEST PIT Old Burn #1 DATE 6-17-92 TIME 0850 END 1500

COORDINATES TBD (2) GRID ELEMENT 175 ft X 175 ft

UTM { N4,483,399 , E 389644 m

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D Metcalf
2. Kristin Harms
3. Ralph J. Smith
4. Sydney Rodgers
5. mike Smerling
6. Steve Cumella
7. Harry Williams

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll Taken By Harry Williams

Exposure NA

NOTES:

(1) This is the South Boundary of the USRADS Grid pattern which is set on 200 ft Grids except for the most Easternly one, which is 177 ft East west and 200 ft North South Grid

(2) TBD = To be determined. We don't have enough data at this date.

(3) Direction Bearing on Test pit is East West and its demenscions were 24 ft Length X 3 ft width X 10 ft depth

(4) The Coordinate for pit was 12 ft East of west end of Trench and Centered North South on Trenches width. This is the Coordinate for Surface Sample OBS-92-101

(5) South Boundary Fence for the TEAD-N Race

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

Profile Along Test Pit- #1 of Old burn/Site/Swmu#6 Page 2 of 3

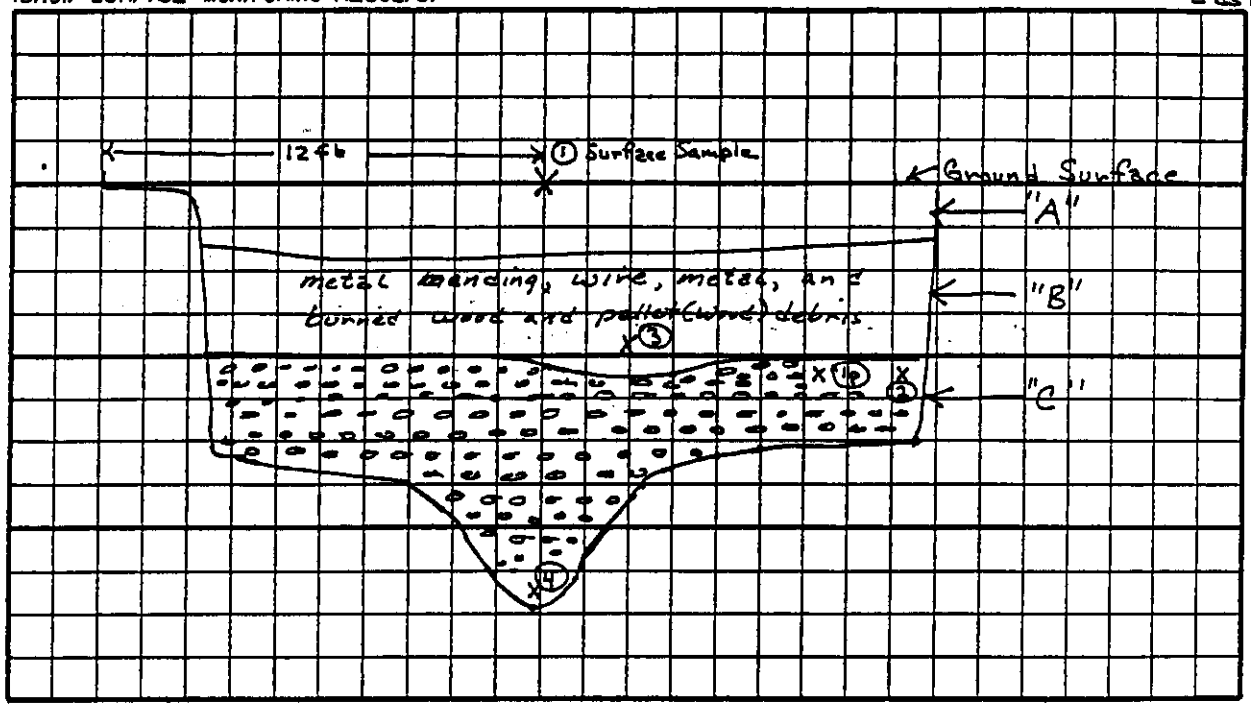
SITE Old Burn Area Site/Swmu #6

TEST PIT Old Burn #1 DATE 6-17-92 TIME 0850 END 1500

COORDINATES UTM = N4,483,399 E380644 GRID ELEMENT Horizontal .5ft .5ft X 1.0-
Vertical 1.0ft

SKETCH OF TEST PIT CROSS SECTION (SHOW SURFACE MONITORING RESULTS)

West ← → East



SCALE 1" = 8.0 FT. (Horizontal)
DEPTH (FT.) 1" = 4ft (Vertical

NOTES: ① = OBS-92-101 = S-1
1b = S-2, ② = S-3 ③ = S-4, ④ = S-5

"A" Pebbly Sandy Silt 10YR 5/3 Variegated, Engineered Soil Pebbles (clasts) = Sm to med C granule - ≤1" Dia. W Rounded 95-100% Quartzite, 5% Black Micritic Limestone. Matrix = Calcareous FG Sandy Silt.

"B" Pebbly sandy silt, 10YR 5/3 Variegated with same description as "A" except there is abundant debris consisting of metal Banding, baling wire, misc. metal, burned small arms debris, burned and non burned wood remenants

"C" Well rounded cobbly & pebbly Fine Grained sand. Cobbles Appear to be Quartzite. The Stratification Seems to be Horizontal Matrix is Calcareous

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	OBS-92-101	< 1.0
S-2	5.0 ft	OBP-92-101	< 1.0
S-3	5.0'	OBP-92-102	< 1.0
S-4	4.0'	OBP-92-103	< 1.0
S-5	10.0'	OBP-92-104	< 1.0
S-6			
S-7			
S-8			

REFERENCE: Field Book, Pg. 30, 31 #6

Attachments #1,

SIGNATURE: S. Cumella

1682FR01.DGN

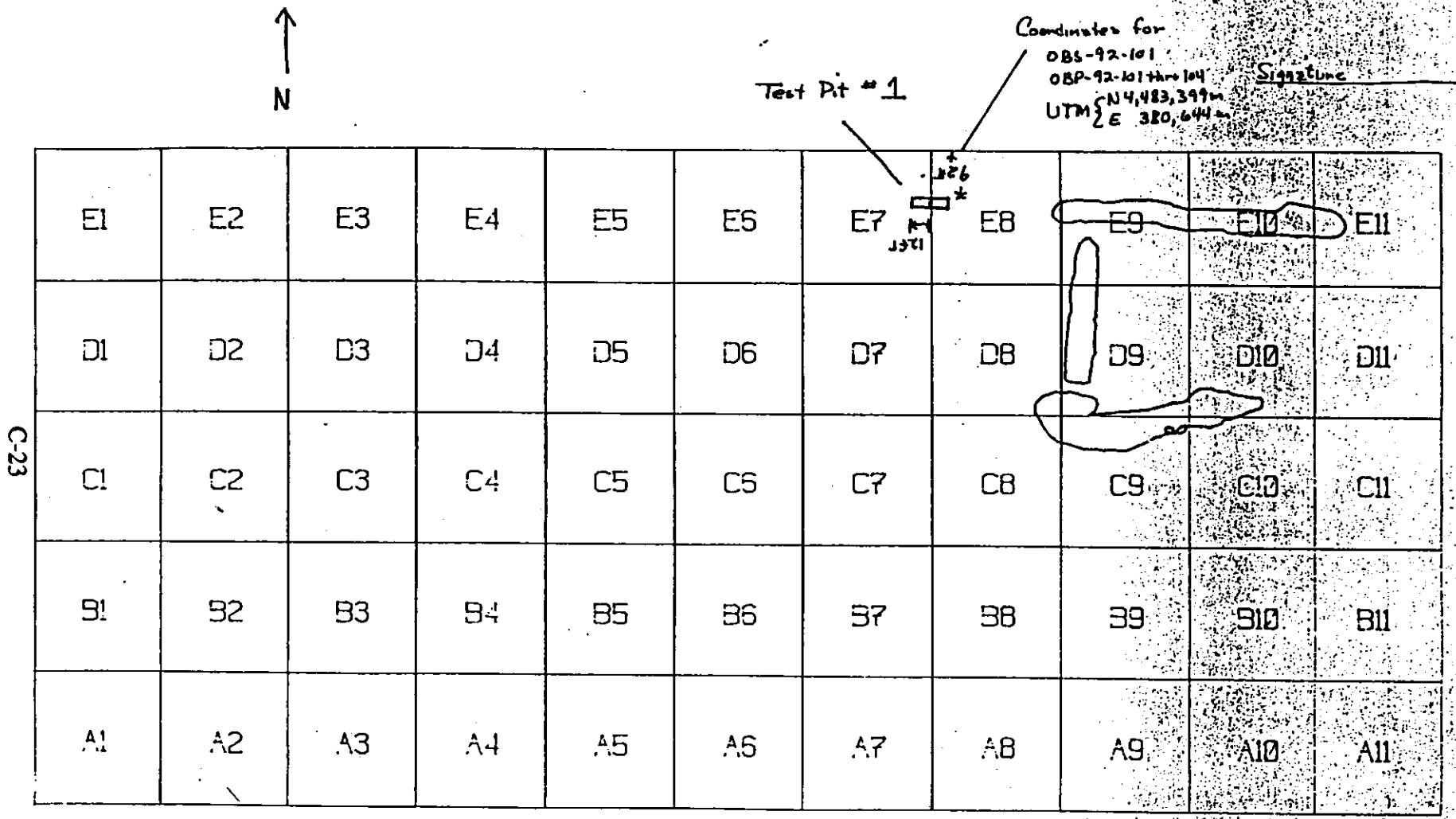
TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

6/17/92

Test Pit #1 (old Burn Area)
SWMU #6

Signature Line



USRADS Grid Pattern

TEST PIT RECORD

Area View of Test Pit- OBP-92-101 thru 104 Page 1 of 3

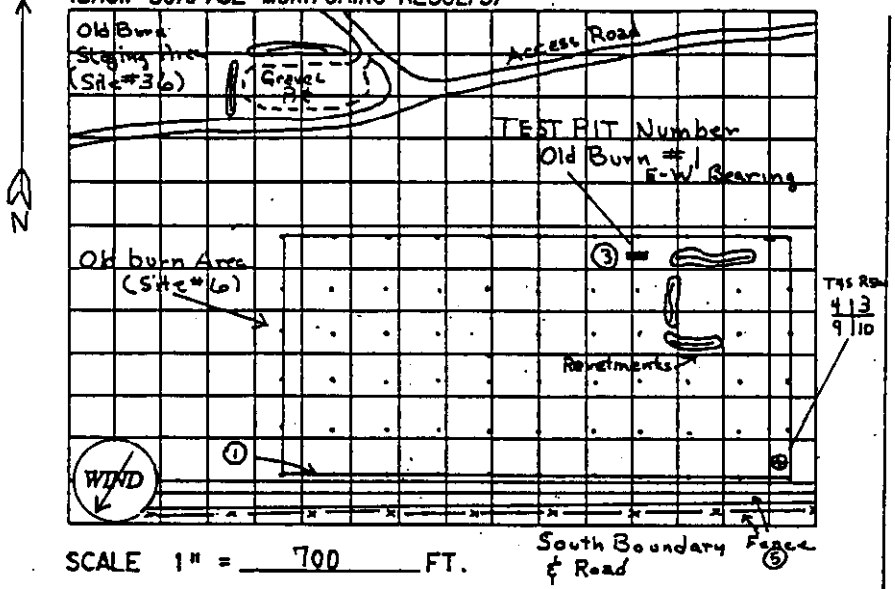
SITE Old Burn Area Site/SWMU #6

TEST PIT Old Burn #1 ② DATE 6-17-92 TIME 0850 END 1500

COORDINATES TBD ② GRID ELEMENT 175 ft X 175 ft

UTM { N4,483,399 , E 389644 m

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D. Metcalf
2. Kristin Harms
3. Ralph J. Smith
4. Sydney Rodgers
5. mike Smerling
6. Steve Cumella
7. Harry Williams

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll Taken By Harry Williams

Exposure N/A

NOTES:

① This is the south Boundary of the USRADS Grid pattern which is set on 200 ft Grids except for the most Easternly one, which is 179 ft east west and 200 ft North South Grid

② TBD = To be determined. We don't have enough data at this date.

③ Direction Bearing on Test pit is East West and its demensions were 24 ft Length X 3 ft width X 10 ft depth

④ The coordinate for pit was 12 ft East of west end of Trench and Centered North South on Trenches width. This is the Coordinate for Surface Sample OBS-92-101

⑤ South Boundary Fence for the TEAD-N Race

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

Profile Along Test Pit- #1 of Old burn/Site/Swmu #6 Page 2 of 3

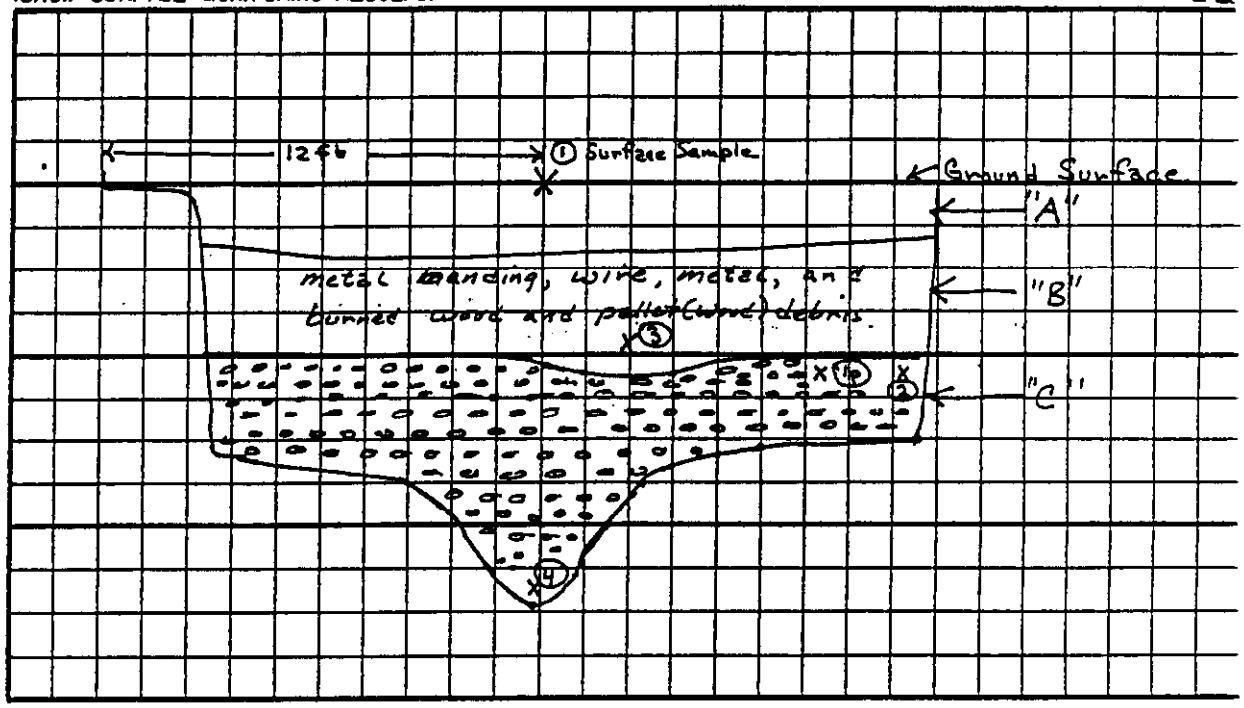
SITE Old Burn Area Site / Swmu #6

TEST PIT Old Burn #1 DATE 6-17-92 TIME 0850 END 1500

COORDINATES UTM = N4,483,399 E380644 GRID ELEMENT Horizontal .5ft .5ft X
Vertical 1.0ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)

West ← → East



SCALE 1" = 8.0 FT. (Horizontal)
DEPTH (FT.) 1" = 4ft (Vertical)

NOTES: ① = OBS-92-101 = S-1
1p = S-2, ② = S-3 ③ = S-4, ④ = S-5

"A" Pebbly Sandy Silt 10YR 5/3 Variegated, Engineered Soil Pebbles (clasts) = 5m to med C granule - ≤1" Dia. W Rounded 95-100% Quartzite, 5% Black Micritic Limestone. Matrix - Calcareous FG Sandy Silt.

"B" Pebbly sandy silt, 10YR 5/3 Variegated with same description as "A" except there is abundant debris consisting of metal Banding, bailing wire, misc. metal, burned small arms debris, burned and non burned wood remenants

"C" Well rounded cobbly & pebbly Fine Grained sand. Cobbles Appear to be Quartzite. The Stratification Seems to be Horizontal

Matrix is Calcareous

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	OBS-92-101	< 1.0
S-2	5.0 ft	OBP-92-101	< 1.0
S-3	5.0'	OBP-92-102	< 1.0
S-4	4.0'	OBP-92-103	< 1.0
S-5	10.0'	OBP-92-104	< 1.0
S-6			
S-7			
S-8			

REFERENCE: Field Book #6, Pg. 30, 31

Attachments #1,

SIGNATURE: S. Cumella

1682FR01.DGN

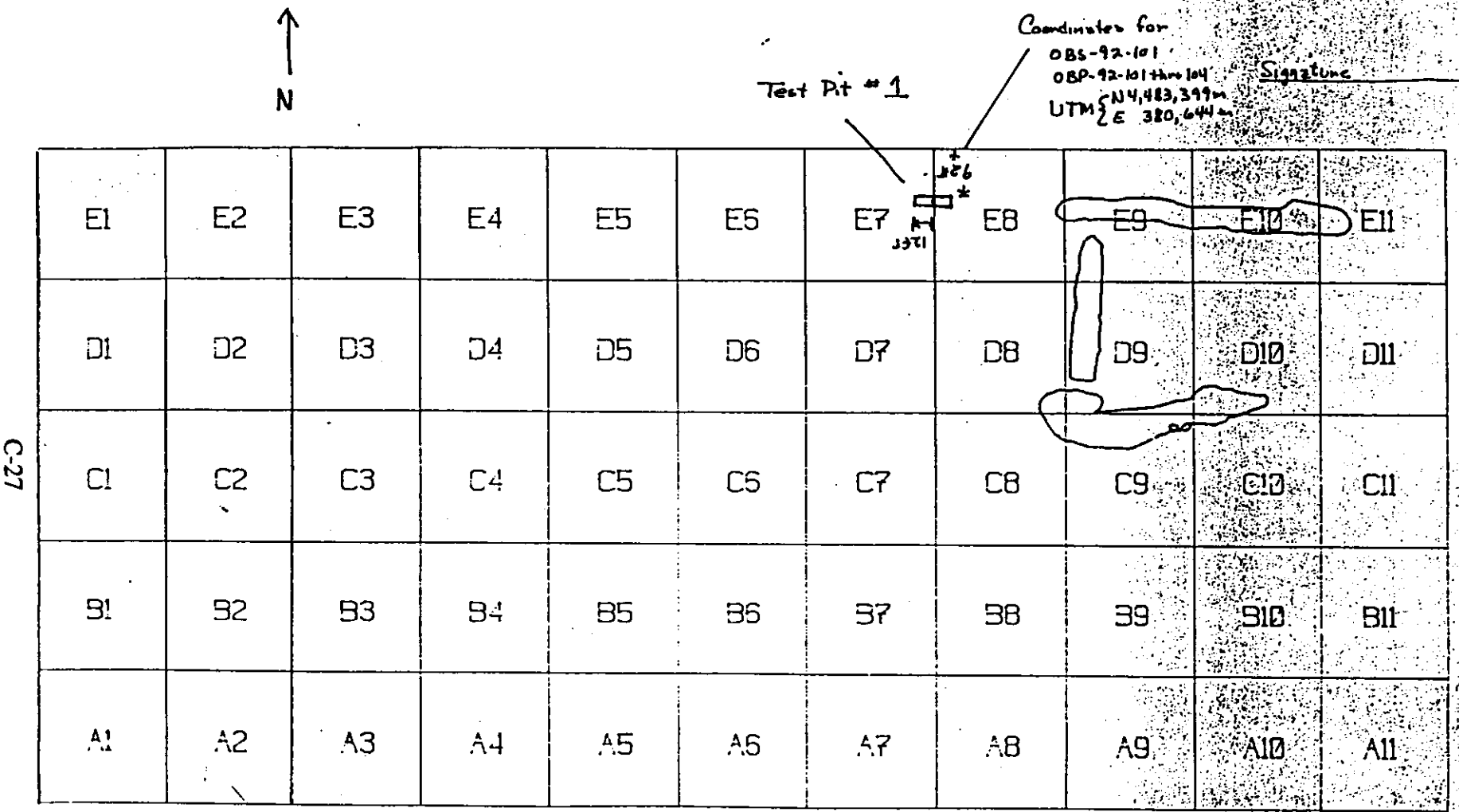
TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Test Pit #1 (old Burn Area)
SWMU #6

6/17/92

Signature



C-27

USRADS Grid Pattern

TEST PIT RECORD

Area View of Test Pit- Old Burn #2 Page 1 of 3

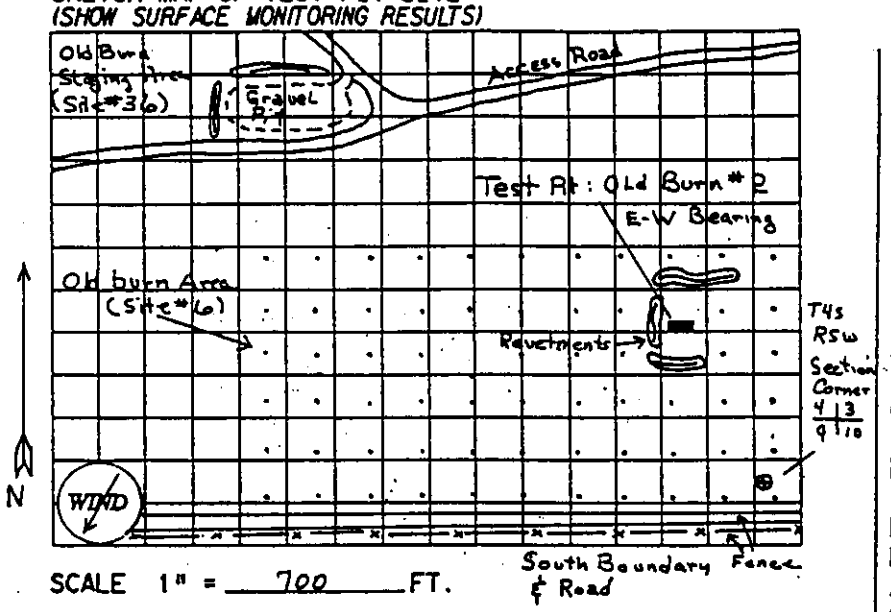
SITE Old Burn Area Site/SWMU #6

TEST PIT Old Burn #2 DATE 6-18-92 TIME 0830 hrs END 1500 hrs

COORDINATES TBD (2) GRID ELEMENT 175 ft X 175 ft

UTM = N 4,483,349 E 380 725

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Kristin Harms
4. Sydney Rogers.
5. Micheal Smerling
6. Harry Williams
7. Ralph J. Smith

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)
Other		

Photographs, Roll Pictures taken by Harry Williams

Exposure N/A

NOTES: (1) This is the South Boundary of the USRADS 200 ft Square grid pattern

(2) TBD - To be determined This will be done when enough data has been gathered

(3) Bearing of the trench is due East-West, and its demensions are 17.0 ft Length X 4.5 ft Width X 10.6 ft depth

(4) The coordinate point for the trench is 12 ft from West end of pit and centered on the width demension

(5) Old Burn Staging Area gravel pit

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

Profile Along Test Pit - OBP-92-201 thru 204 Page 2 of 3

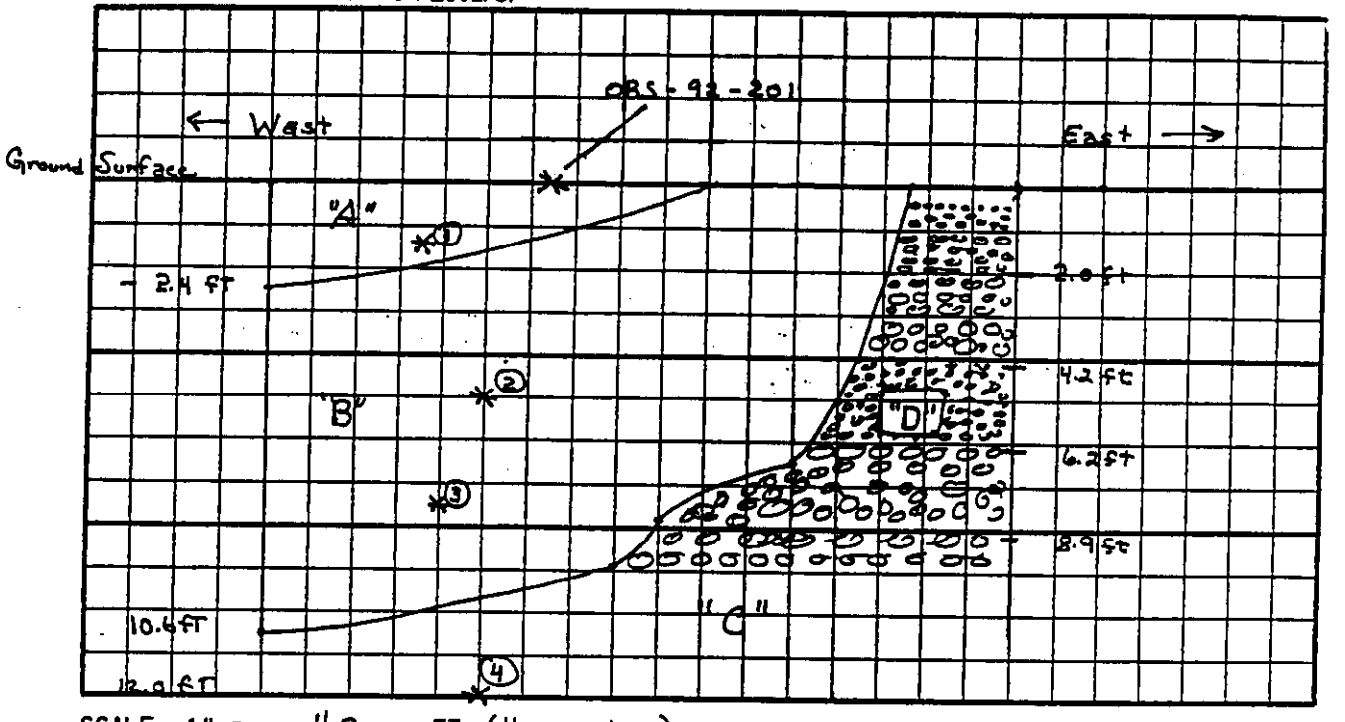
SITE Old Burn Area Site #6

TEST PIT #204 Burn Area DATE 6-18-92 TIME 0830 hrs END 1500 hrs

COORDINATES TBD ② of ④ GRID ELEMENT

UTM = N4,483,349 E 380,728

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT. (Horizontal)
DEPTH (FT.) 1" = 4.0 ft (vertical)

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	OBS-92-201	< 1.0
S-2	5.0'	OBP-92-201	< 1.0
S-3	7.5'	OBP-92-203	< 1.0
S-4	12.0'	OBP-92-204	< 1.0
S-5	2.0	OBP-92-202	< 1.0
S-6			
S-7			
S-8			

NOTES: ① Sample OBP-92-201 ② Sample OBP-92-202 ③ Sample OBP-92-203 ④ Sample OBP-92-204

"A") Mostly very fine to fine grained sand, some medium to coarse sand, little sub-rounded quartzite pebbles, dry calcareous soils 10YR 4/3

"B") Mostly very fine to fine Sand, some subrounded quartzite pebbles, little medium to coarse sand, moist soil, is calcareous. Pebbles contain some Limestone. Color= 7.5YR 5/3

"C") Color 10YR 5/3. Dry mostly clay, some silt some sub rounded quartzite pebbles

"D") Mostly fine sand, some silt with Sub-rounded quartzite pebbles. Various layers of normal graded Pebbles visable.

"B") Cont. This soil contains metal Banding, wire, metal and charcoal and charred wood debris.

REFERENCE: #6 Field Book, Pg. 32, 33, 34

Attachments #1,

SIGNATURE

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Old Burn Area Site/SWMU #6

6/18/92

Test Pit #2

Signature _____

Section Corner 4 3 9 10 T4S, R5W

Southern Boundary of Grid

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1
D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1

Test Pit #2 Old Burn

13 Yds

N

Coordinates For Center of Trench

Sample OBS-92-201

OBP-92-201 thru 204

UTM = N 4,483,349
E 380,725

TEST PIT RECORD

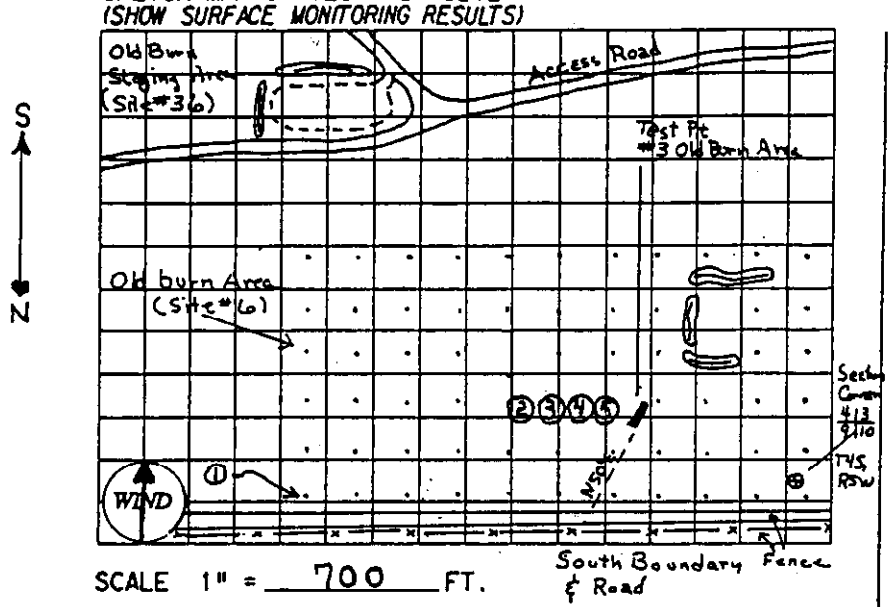
Area View of Test Pit - OBS-92-301, OBP-92-301 thru 304 Page 1 of 3

SITE Old Burn Area Site #6

TEST PIT #3 Old Burn DATE 6-19-92 TIME 0830 hrs END 1430 hrs

COORDINATES UTM = N - 4,483,183 m GRID ELEMENT 175 ft x 175 ft
E 380,685 m

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 700 FT.

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Kristin Harms
4. Ralph J. Smith
5. Sydney Rogers
6. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll NA

Exposure NA

NOTES: See next page

(1) The south boundary of the USRADS grid map of the old burn Area. The grid was established on 200 ft centers

(2) Test Pit #3 Old Burn Areas bearing is N50°E and its demensions are 21.3 ft. length X 3 ft width X 10 ft depth

(3) The coordinates for this pit are based on the OBS-92-301 surface sample which lies 8.6 ft. along the bearing of the pit, from its Southern width edge, and it is calculated and centered width wise to the pit

(4) There seems to be no apparent subsurface contamination in this pit. Samples were taken from the pit, but since no observable contamination was present, no pictures were taken

(5) Pit Bearing is N50°E

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

Profile Along Test Pit - OBP-92-301 through 304

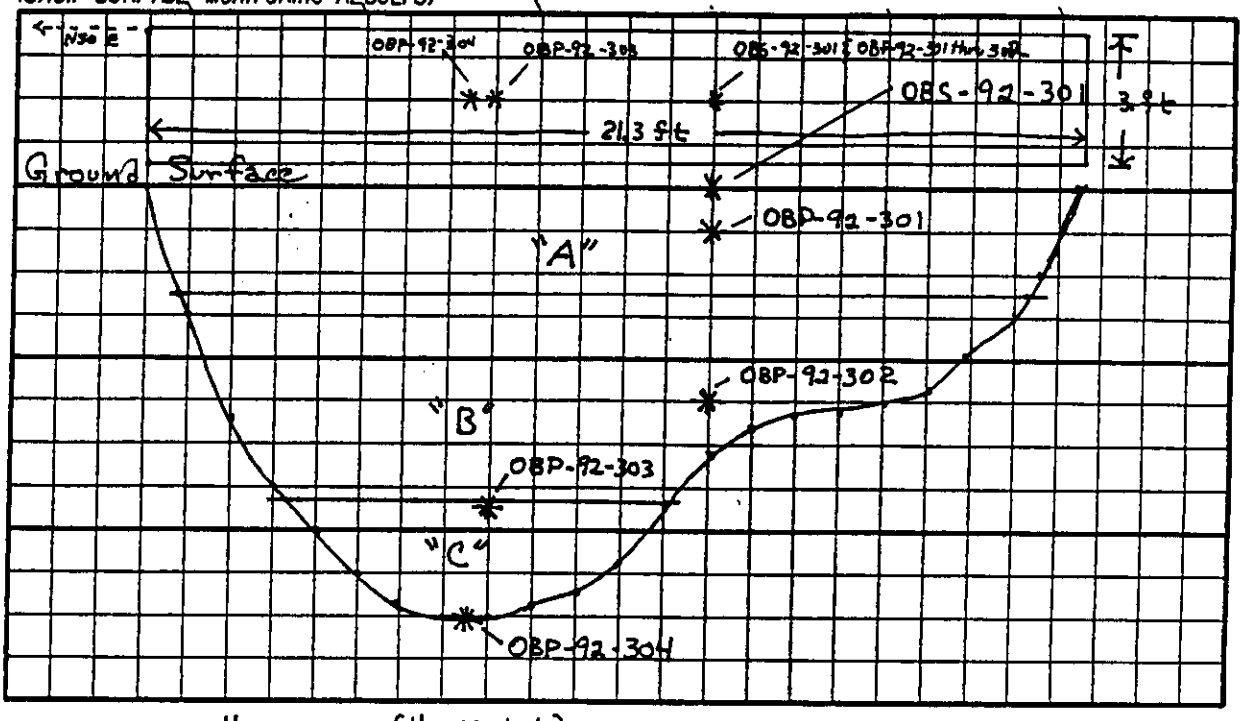
SITE Old Burn Area Site / SWMU #6

TEST PIT #3 Old burn DATE 6-19-92 TIME 0830 hrs END 1430 hrs

COORDINATES ~~N4,483,182m E380,881m~~ UTM GRID ELEMENT 1.0 ft X 1.0 ft

UTM = N 4,483,183 E 380,685

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT. (Horizontal)
DEPTH (FT.) 1" = 4.0 ft (Vertical)

NOTES:

"A") Mostly silt, some fine sand, a few small subrounded pebbles

"B") Mostly silt, some fine sand, some clay

"C") Mostly very fine to fine sand, some large pebbles to small cobble gravels

Note: No observable contamination was seen in this test pit

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. (VOA) PPM
S-1	Surface	OBS-92-301	Negative
S-2	1.0 ft	OBP-92-301	Negative
S-3	5.0 ft	OBP-92-302	Negative
S-4	7.5 ft	OBP-92-303	Negative
S-5	10.0 ft	OBP-92-304	Negative
S-6			
S-7			
S-8			

REFERENCE: #6 Field Book, Pg. 35, 36

Attachments #1

SIGNATURE: Daphne McKall

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment #1

Old Burn Area Site/SWMU #6

Test Pit #3

Signature _____

Section Corner
4 | 3
9 | 10
T4S, R5W

USRAD Grid Map

Southern Boundary of Grid

A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1
D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1

Test Pit #3 Old burn Area

N

Coordinates For Center of Test Pit at Sample OBS-92-301
OBP-92-301 thru 304

UTM = N 4,483,183 m
E ~~381,097m~~

CHEMICAL RANGE

TEST PIT RECORD

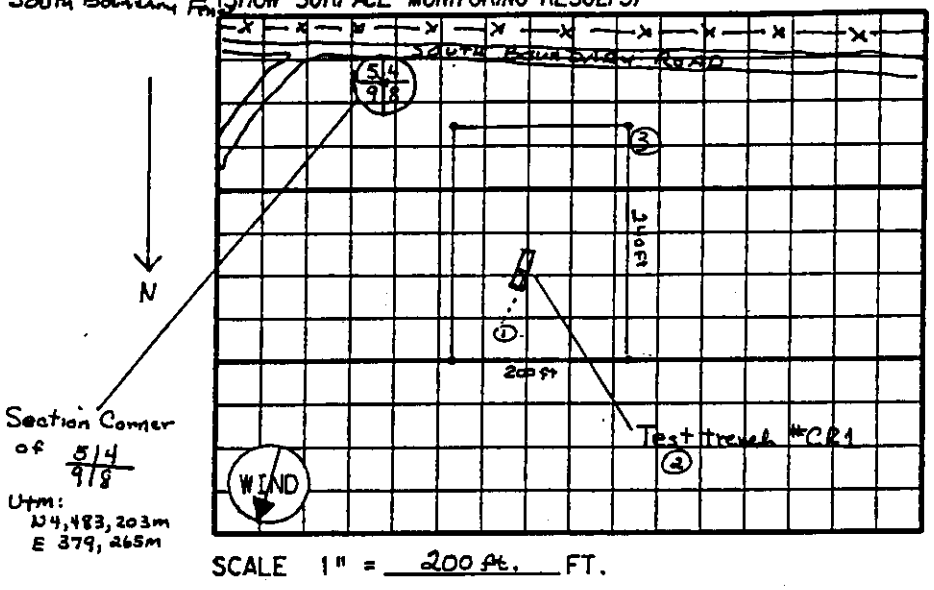
Area View of Test Pit - CRS-92-101 & CRT-92-101 thru 104 Page 1 of 2

SITE Chemical Range Site/SWMU #7

TEST PIT # CR 1 DATE 6-2/-92 TIME 0800 hrs END 1200 hrs

COORDINATES UTM: (N4,483,252m) (E379,248m) GRID ELEMENT 50 ft X 50 ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 200 ft. FT.

NOTES: ① Strike of the trench "CR 1 is N 11°E

② The trench's demensions are 24ft length X 3.5ft width X 10 ft depth. Its coordinate are tied to the center point of the top view of the trench. they are UTM: (N 4,483, 252m) (E 379, 248m).

③ the Outer perimeter, a 200 ft X 240 ft cordoned off Area, Has been surveyed by an USRADS Team.

VFG = Very fine Grained Sand
FG = Fine Grained Sand
Ls = Limestone
WR = Well Rounded
Otzte = Quartzite
[XXXX] = Burned Debris

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgers
6. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)
Other		

Photographs, Roll Roll #3 on John Burgers Camara
Exposure 10, 11, 12, 13

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

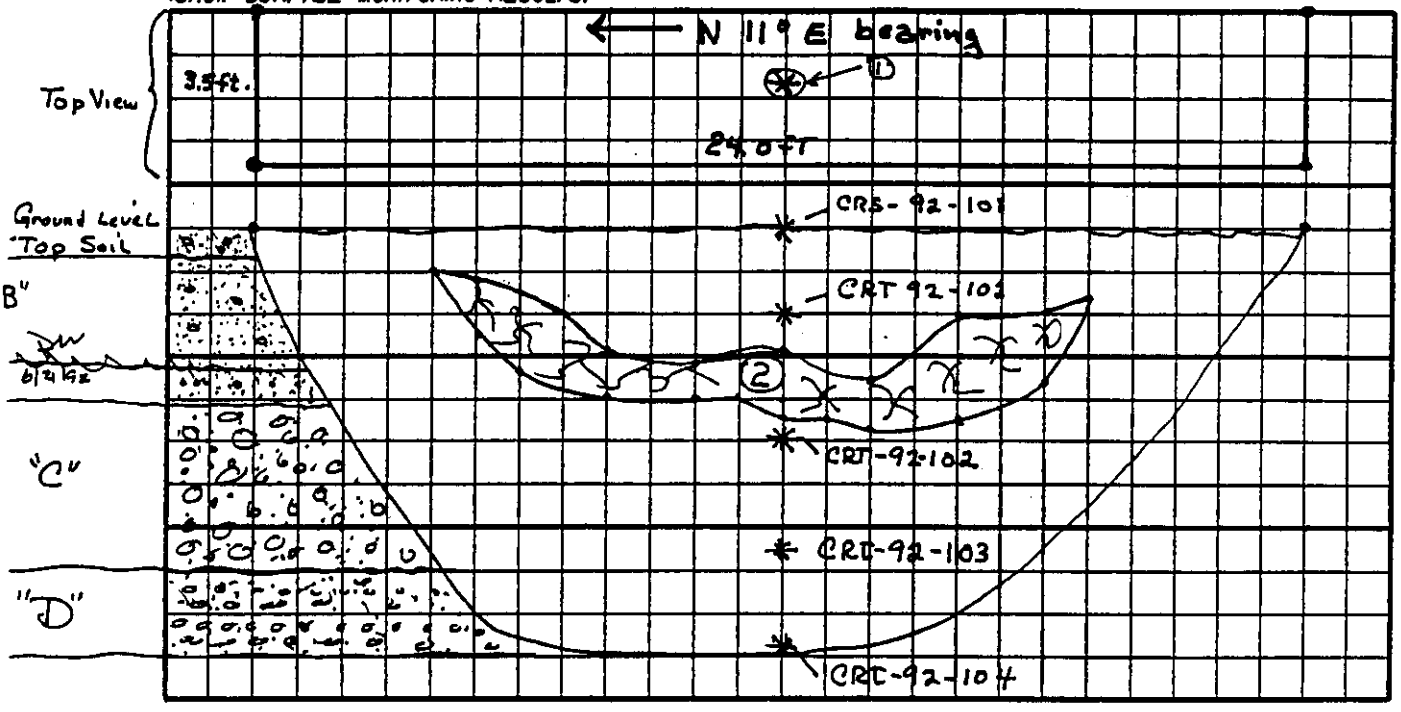
Profile Along Test Pit- CRS-92-101 & CRT-92-101 thru 104 Page 2 of 2

SITE Chemical Range Site/SWMU #7

TEST PIT CR #1 DATE 6-21-92 TIME 0800 hrs END 1200 hrs

COORDINATES UTM: (N 4,483,252 m) (E 379,248 m) GRID ELEMENT 2nd 1.0 ft x 1.0 ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.
DEPTH (FT.)

NOTES: ① Point where coordinate for the pit and the samples were taken from: UTM: (N 4,483,252 m) (E 379,248 m)

② Burned metal and munition debris consisting of burned Containers of different types. Numerous flap flares, smoke flares, & Trip flares

"A" Top Soil = Calcareous slighty pebbly VFG Sand Med. Pebble Clast = 90-95% Quartzite 5-10% Blk Micritic Ls

Color: 10YR 6/4 ~~Very Pale Brown~~ Light Yellowish Brn

"B" Calcareous, Silty FG Sand, Slighty Pebbly with WR pebble clasts of 90-95% Quartzite, 5-10% Blk micritic Ls. 10YR 5/4 = Yellowish Brown

"C" Sm Cobble to Lge Pebble gravel Sandy Gravel Clasts: WR Quartzite 90-95%, WR Blk Micritic Ls 5-10%

~~Dark Yellowish Brown~~ Sand = VF grained Calcareous 10YR 5/4 = Yellowish Brown

"D" Sandy WR Pebble gravel - Med Size Pebbles of 90-95% Qtzite, 5-10% Blk Micritic Ls

Sand = Calcareous FG Sand.

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	CRS-92-101	Negative
S-2	2.0	CRT-92-101	Negative
S-3	5.0	CRT-92-102	Negative
S-4	7.5	CRT-92-103	Negative
S-5	10.0	CRT-92-104	Negative
S-6			
S-7			
S-8			

REFERENCE: #3 Field Book, Pg. 35,36

Attachments

SIGNATURE:

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

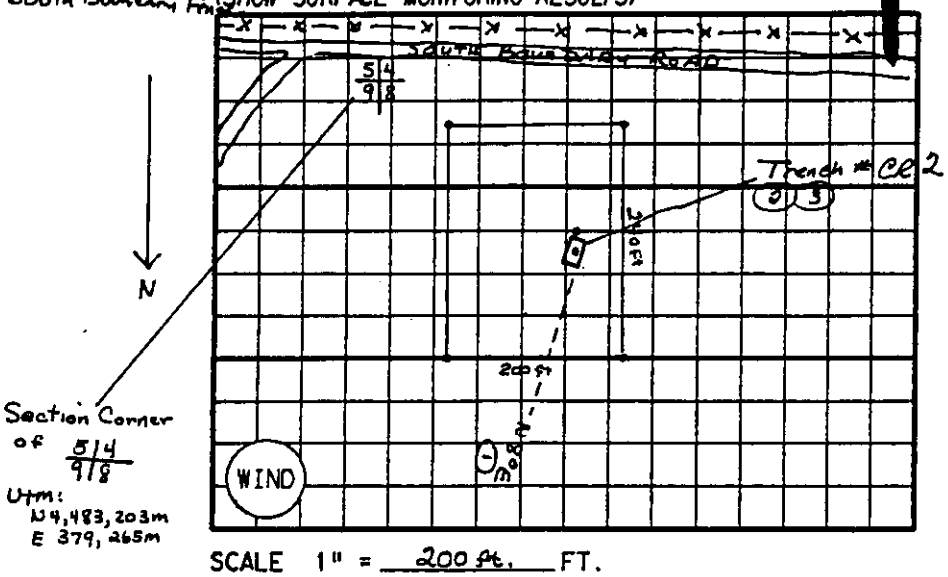
Area View of Test Pit- CRS-92-201 CRS-92-201thru 204 Page 1 of 2

SITE Chemical Range Site/SWMU #7

TEST PIT # CR2 DATE 6-21-92 TIME 1230 hrs END 1630 hrs

COORDINATES UTM (N4,483,249m)(E379,221m) GRID ELEMENT 50ft X 50ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 200 ft. FT.

NOTES: (1) Trench #CR2 Strike bearing is N8°E
(2) The Trenches demensions are 28 ft X 3.5ft X 10ft deep
(3) The outer perimeter area that has been cordoned off has been surveyed by the USRADS Team.

VFG = Very Fine Grained
MG = Medium grained
WR = Well Rounded
Calc = Calcareous
SA = Sub Angular
FG = Fine grained
blk = black

CREW MEMBERS:

1. Douglas D Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgers
6. Micheal Smenling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll NA

No unsafe Contamination was present

Exposure NA

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

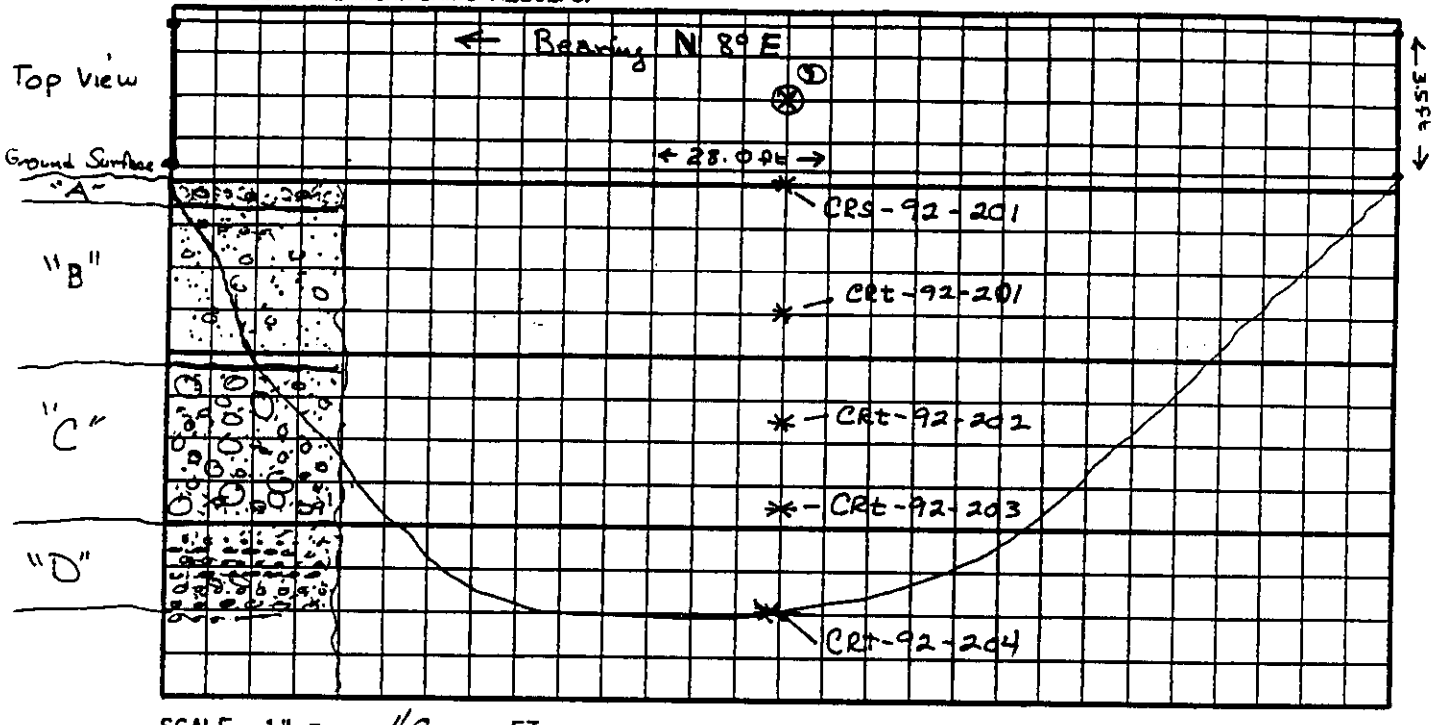
Profile Along Test Pit- CRS-92-201 & CRT-92-201 thru 204 Page 2 of 2

SITE Chemical Range Site / SWMU #7

TEST PIT #CR2 DATE 6-2-92 TIME 1230 hrs END 1630 hrs

COORDINATES UTM: (N 4,483,249) (E 379,221 m) GRID ELEMENT 1.0 ft X 1.0 ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.
DEPTH (FT.)

NOTES: ① Point of trench where Coordinates are given UTM for CRS-92-201 & CRT-92-201 thru 204

"A" Top Soil = Calcareous slightly pebbly VFG Sand
Clasts = med G. Pebbles < 90-95% WR quartzite 5-10% WR Blk micritic Ls
Matrix = Calc. SA VFG Sand
Color = 10YR 6/4 = Light Yellowish Brown

"B" Calc. Slightly medium size pebble, Silty FG Sand Clasts: 90-95% WR Quartzite 5-10% WR Blk Micritic Ls
Matrix: Calc. FG, SA Sand
Color 10YR 5/4 Yellowish Brown

"C" Sm Cobble to Lge pebble sandy gravel
Clasts: 90-95% WR Quartzite 5-10% WR Blk Micritic Ls
Matrix: VFG Calcareous SA Sand
Color: 10YR 5/4 Yellowish Brown

"D" Sandy med size pebble gravel
Clasts: 90-95% WR Quartzite 5-10% WR Blk Micritic Ls
Sand: Calcareous FG SA Sand
Color: 10YR 5/4 = Yellowish Brown

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	CRS-92-201	Negative
S-2	3.0	CRT-92-201	Negative
S-3	5.5	CRT-92-202	Negative
S-4	7.5	CRT-92-203	Negative
S-5	10.0	CRT-92-204	Negative
S-6			
S-7			
S-8			

REFERENCE: #3 Field Book, Pg. 36

Attachments

SIGNATURE:

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

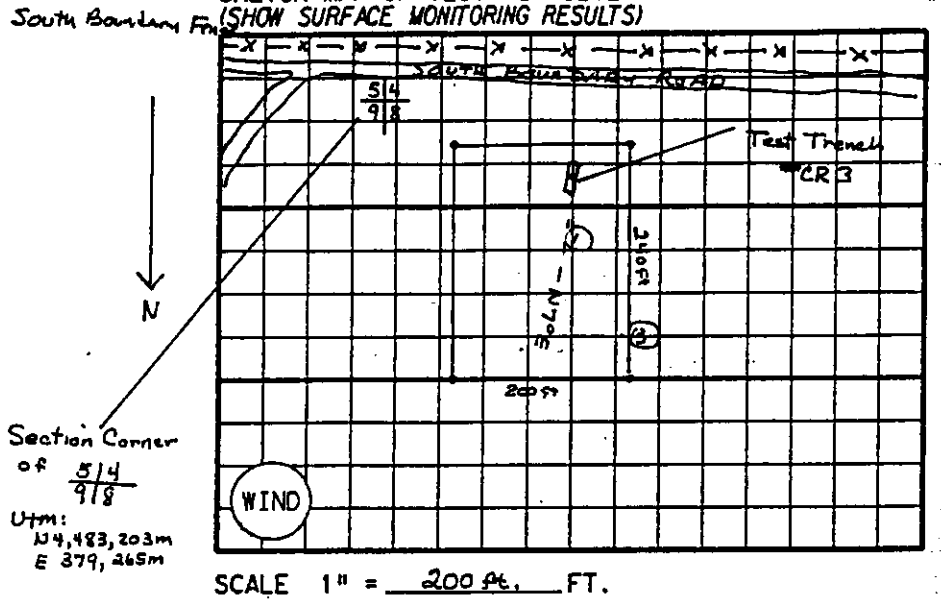
Area View of Test Pit- CRS-92-301 & CRT-92-301 Thru 304 Page 1 of 2

SITE Chemical Range Site/Sumu #7

TEST PIT #CR3 DATE 6-23-92 TIME 0800 hrs END 0930hrs

COORDINATES UTM(N4,483,216m)(E 379,226m) GRID ELEMENT 50Ft X 50Ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 200 ft. FT.

NOTES: (1) Strike bearing for trench #CR3 is North 7° East, and its demensions are 20 ft length X 3.5ft width X 10ft depth. The trenches coordinates are based on the center point of the top view of the trench (2) No picture were taken of the trench as there was no observable sign of contemination (3) The outer perimeter Shown is the grid area that was layed out and Surveyed by an USRADS team

VFG: VERY fine grained
Sm: Small
WR: Well rounded
SA: Subangular
USRADS: Ultra Sonic Ranging and Data System

CREW MEMBERS:

1. Douglas D Metcalf
2. Denise Dunham
3. ~~Kristin~~ Harris
4. R.J. Smith
5. Sydney Rodgers
6. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll N/A (2)

Exposure N/A

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

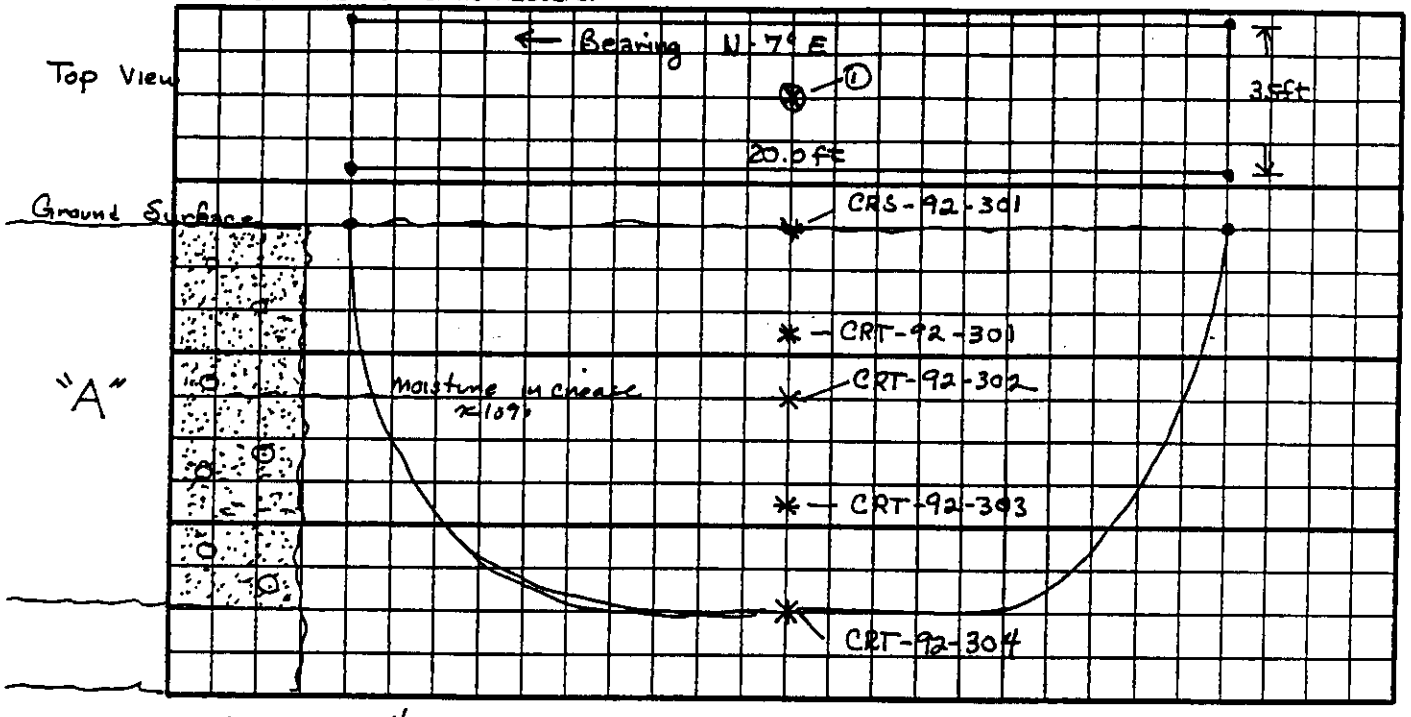
Profile Along Test Pit - CRS-92-301 & CRT-92-301thru 304 Page 2 of 2

SITE Chemical Range Site/SWMU #7

TEST PIT # CR 3 DATE 6-23-92 TIME 0800 hrs END 0930 hrs

COORDINATES _____ GRID ELEMENT 1.0 ft X 1.0 ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 40 FT.
DEPTH (FT.)

NOTES: ① Coordinate point for trench and Samples CRS-92-301 & CRT-92-301 thru 304

"A") Silty VFG Sand, Slightly Gabbly, Calcareous

Clasts: Sm Cobbles, WR Quantzite

Matrix: Silty, SA VFG Sand, Calcareous

Color: 10YR5/4 Yellowish Brown

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	CRS-92 301	Negative
S-2	2.5 ft	CRT-92 301	Negative
S-3	5.0 ft	CRT-92 302	Negative
S-4	7.5 ft	CRT-92 303	Negative
S-5	10.0 ft	CRT-92 304	Negative
S-6			
S-7			
S-8			

REFERENCE: #3 Field Book, Pg. 38, 39

Attachments _____

SIGNATURE: [signature]

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

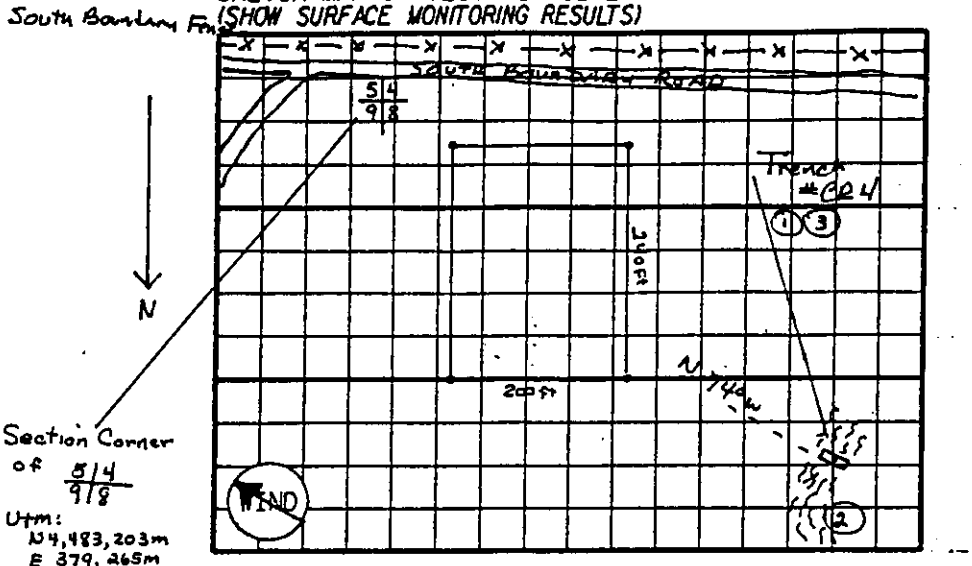
Area View of Test Pit - observation Trench only (No Samples Taken) Page 1 of 2

SITE Chemical Range Site / SWMU #7

TEST PIT #CR4 DATE 6-23-92 TIME 1030 hrs END 1100 hrs

COORDINATES UTM: (N4,483,314m) (E379,186m) GRID ELEMENT 50Ft X 50Ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 200 Ft. FT.

CREW MEMBERS:

1. Douglas Metcalf
2. Denise Dunham
3. Kristin Harms
4. R.J. Smith
5. Sydney Rodgers
6. Michael Snierling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll N/A
no pictures taken (3)

Exposure N/A

NOTES: (1) The decision to dig this trench outside the USRADS surveyed grid, was based on the presence of considerable amounts of debris, mainly white phosphorus grenade debris, lying on the surface in the Local, and the evidence that soil disturbance had take place where the debris was located. The Trench was placed as to cross cut the disturbance.

(2) [redacted] - General surface Soil disturbance

(3) The trench demensions are 19Ft X 3.5Ft X 4.5Ft deep and its strike bearing is North 74° West

(4) There was no observable contamination in the test Trench number CR4. Therefore no pictures were taken

FG = Fine grained

WR = Well rounded

SA = Sub Angular

Ls = Limestone

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

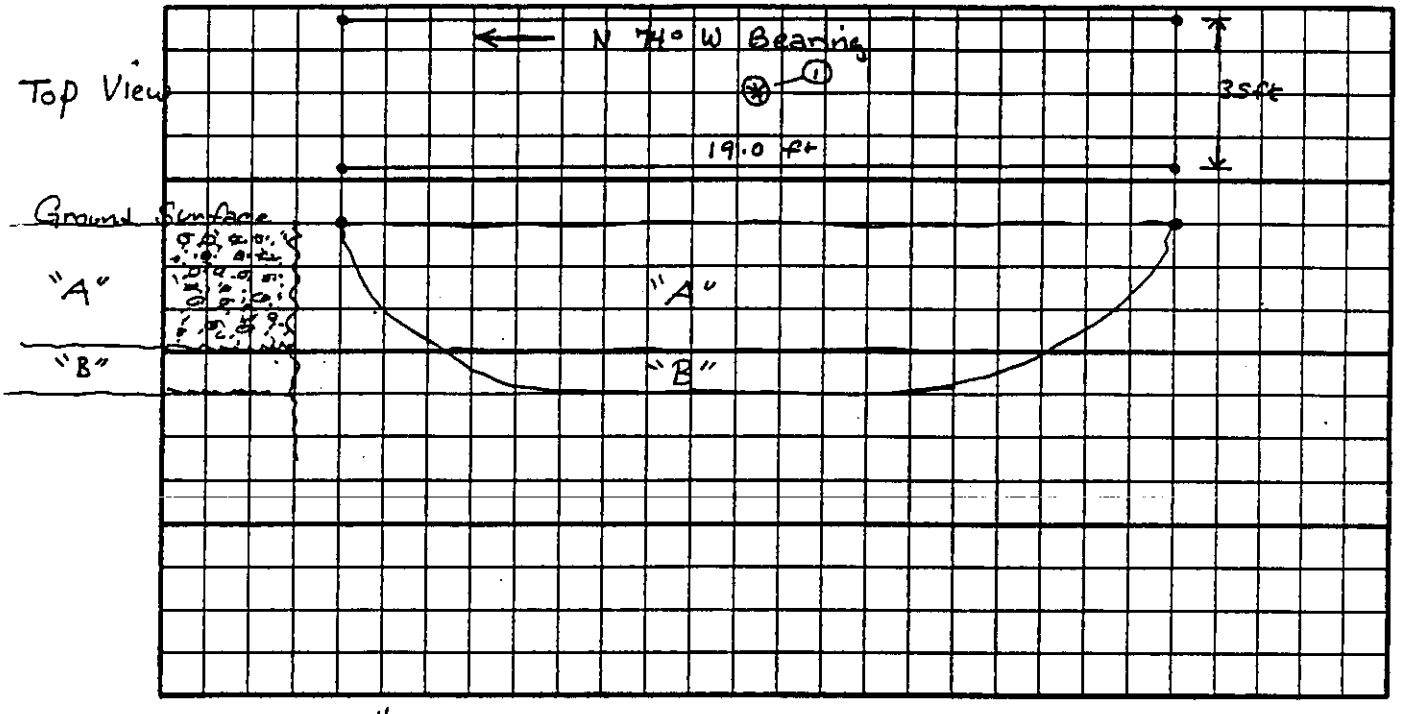
Profile Along Test Pit – Observation Trench (No Samples Taken) Page 1 of 2

SITE Chemical Range Site / SWMU #7

TEST PIT * CR4 DATE 6-23-92 TIME 1030 hrs END 1100 hrs

COORDINATES UTM (N 4,483,314m)(E 379,126m) GRID ELEMENT 1.0 ft X 1.0 ft

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.
DEPTH (FT.)

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. (VOA) PPM
S-1	N/A	N/A	Negative
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

NOTES: ① Point where coordinates for the pit have been calculated
UTM: N 4,483,314 m
E 379,126 m
"A" 0-3.0 ft - Medium to Lge pebble silty FG Sand
Clasts: 90-95% WR Quartzite, Size range = 2 inches to 1" diameter
Matrix - Calcareous SA FG Silty Sand
Color = ~~2.5 Y 6/2~~ 10 YR 5/4 = Yellowish Brown
"B" 3.0 ft - 4.0 ft = Slightly Cobbly med to Lge Pebble gravel with FG Sand matrix
80-90% Clasts 90-95% WR, Cobbles (5cm) & Pebble Quartzite
5-10% WR Lge - med Blk Micritic Ls
Clast supported
10-20% Matrix - Calcareous FG silty Sand (SA)
Color: 10 YR 6/2: Light Brownish Gray

REFERENCE: 3 Field Book, Pg. 38, 39

Attachments

SIGNATURE: Douglas D McKay

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

AED TEST RANGE

TEST PIT RECORD

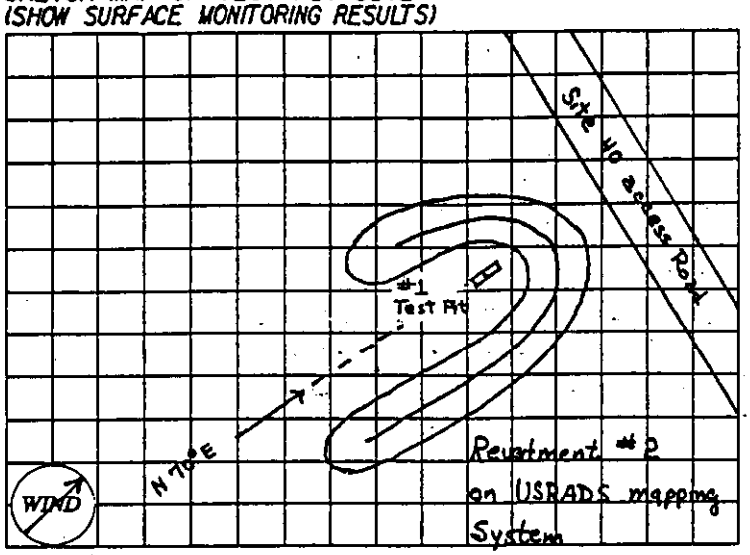
Area View of Test Pit - ARS-92-101 & ARP.92-101 Page 1 of 3

SITE AED Test Range Site / SWMU - 40

TEST PIT AED #1 DATE 7/July/92 TIME 1415 END 1540

COORDINATES State Planer: Northing - 802500' Easting - 1,727,551' GRID ELEMENT 25ft. X 25ft.

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 100 FT.

(2) See Attachment #1 (Sketch of AED Test Range Site/SWMU 40

NOTES: (1) Test pit demensions are 12.0 ft Length X 3.5ft width X 9.0 ft depth.

(2) Attachment #1 shows map of the revetments at Site/SWMU-40 with Numbers Assigned to the revetments. This is the revetment TOAED 2 Bermed area

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Ken Pill
4. J. A Burger
5. R. J. Smith
6. Sydney Rodgers
7. Micheal Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other N/A

Photographs, Roll #1 on John Burgers Camera

Exposure #2, #3, #4

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

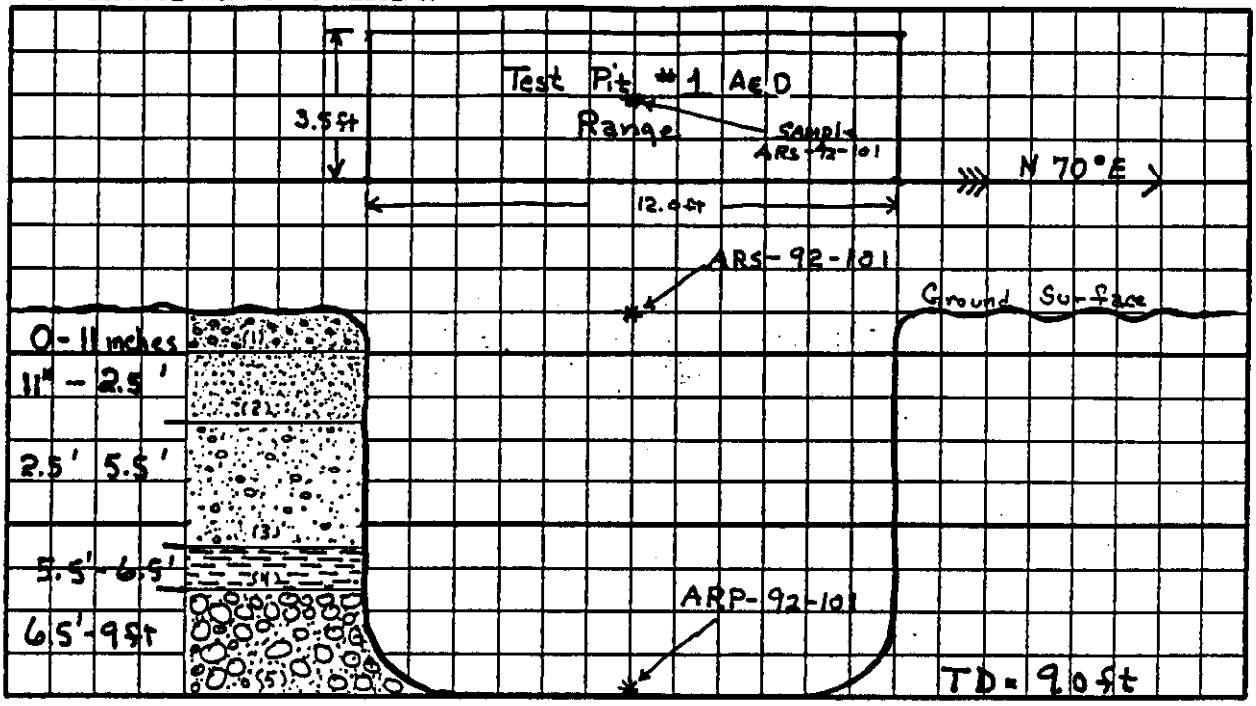
Profile Along Test Pit - ARS-92-101 & ARP-92-01 Page 2 of 3

SITE AED Test Range - Site #40

TEST PIT AED #1 DATE 7 JULY 92 TIME 1415 END 1540

COORDINATES: State Planer: Northing - 4,487,718' GRID ELEMENT 1 ft x 1 ft
Easting - 374,642 feet

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.
DEPTH (FT.) 9.0 Ft.

NOTES: #1 was Sampled

1) Calc. matrix: rootlets, rounded, mostly Quartzite clasts, loose non-cemented, no caliche on clasts, See Also pge. 1
2) Silty sand; mod. hard well Rounded quartzite clasts, calcareous matrix
3) Pebbly Sand: Quartzite Clasts 1/2" dia. 10 YR 6/4, Calcareous matrix
4) Clay: 2.5 Y 8/4, Calcareous, soft blocky fracturing
5) Boulders & Silty Sand; Clasts ≅ 10" diameter Sample taken on top of unit #5, Rejection 9 feet

Note: Unit #1 may be surface wash material

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. (VOA) PPM
S-1	0-6 inches	ARS 92-101	Negative
S-2	9.0 feet	ARP 92-101	Negative
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

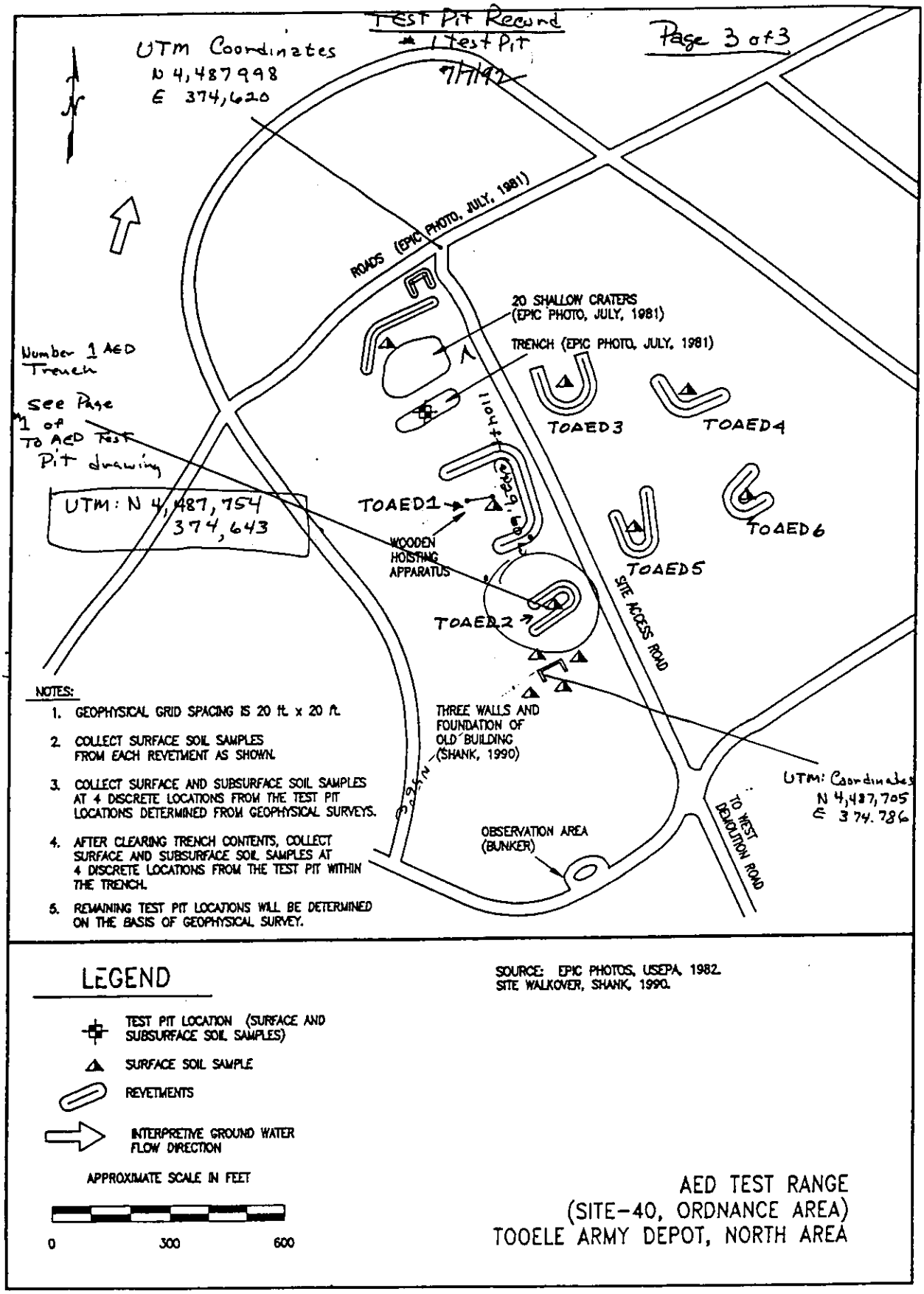
REFERENCE: #3 Field Book, Pg. 20, 43

Attachments AED Range Map

SIGNATURE: [signature]

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA


Test Pit Record
Test Pit
Page 3 of 3
UTM Coordinates
N 4,487998
E 374,620
ROADS (EPIC PHOTO, JULY, 1981)
20 SHALLOW CRATERS
(EPIC PHOTO, JULY, 1981)
TRENCH (EPIC PHOTO, JULY, 1981)
Number 1 AED Trench
See Page 1 of TO AED Test Pit drawing
UTM: N 4,487,754
374,643
TOAED1
TOAED2
TOAED3
TOAED4
TOAED5
TOAED6
WOODEN HOISTING APPARATUS
SITE ACCESS ROAD
THREE WALLS AND FOUNDATION OF OLD BUILDING (SHANK, 1990)
OBSERVATION AREA (BUNKER)
TO WEST DEMOLITION ROAD
UTM: Coordinates
N 4,487,705
E 374.786
NOTES:
1. GEOPHYSICAL GRID SPACING IS 20 ft. x 20 ft.
2. COLLECT SURFACE SOIL SAMPLES FROM EACH REVETMENT AS SHOWN.
3. COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT LOCATIONS DETERMINED FROM GEOPHYSICAL SURVEYS.
4. AFTER CLEARING TRENCH CONTENTS, COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT WITHIN THE TRENCH.
5. REMAINING TEST PIT LOCATIONS WILL BE DETERMINED ON THE BASIS OF GEOPHYSICAL SURVEY.
LEGEND
TEST PIT LOCATION (SURFACE AND SUBSURFACE SOIL SAMPLES)
SURFACE SOIL SAMPLE
REVETMENTS
INTERPRETIVE GROUND WATER FLOW DIRECTION
APPROXIMATE SCALE IN FEET
0
300
600
SOURCE: EPIC PHOTOS, USEPA, 1982.
SITE WALKOVER, SHANK, 1990.
AED TEST RANGE
(SITE-40, ORDNANCE AREA)
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

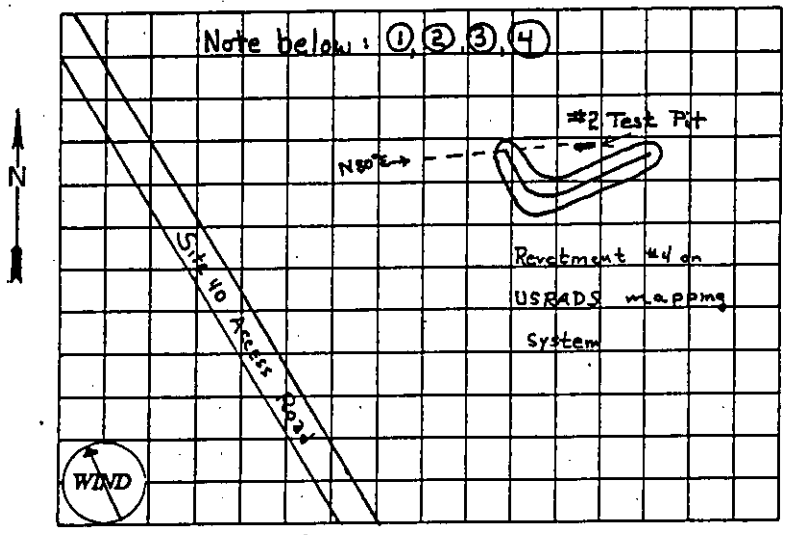
Area View of Test Pit - ARS-92-201 & ARP-92-201 Page 1 of 3

SITE AED TEST Range Site 40

TEST PIT AED #2 DATE 8 July 92 TIME 0830 hrs END 1050 hrs

COORDINATES State Planer: N: 802, 937 feet E: 1,728,016 feet GRID ELEMENT 50' X 50'

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 200 FT.

NOTES: ① Center of the pit lies North 85° West of this point by 56.5 Ft.

② See Attachment #1. A general outline of the AED Test Range Area.

③ UTM Coordinates for the center of the pit, which includes samples ARS-92-201 & ARP-92-201 are UTM: (N 4,487,778m)(374,834m).

④ Test pit demensions Are 14ft length x 3.5 Ft Width X 7.0 Ft depth (Note: digging rejection due to prota, small boulder Conglomerate Bearing = N 80° E on strike

CREW MEMBERS:

1. Douglas D. Metcalf
2. Denise Dunham
3. Ken Pill
4. J.A Burger
5. R.J. Smith
6. Sydney Rodgers
7. Michael Smenling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll 1

Exposure 5, 6, 7, 8

#5. Along trench.

#6. Pit, next to Scrap metal

#7. Far view N to Trench looking N 85° W

#8 Close-up of gravel bed in trench

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

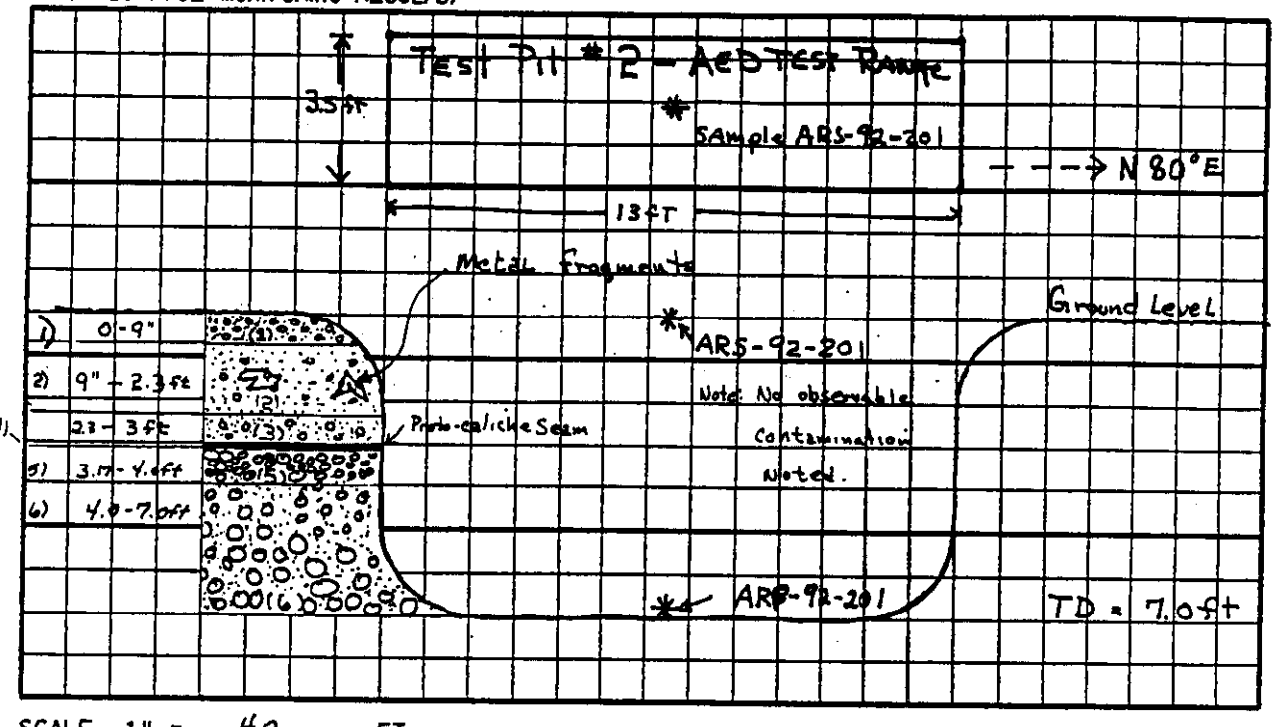
Profile Along Test Pit - ARS-92-201 / ARP-92-201 Page 2 of 3

SITE AED Test Range, Site 40, Revetment 4

TEST PIT 2 DATE 8 July 92 TIME 0830 END 1050

COORDINATES State Plane: N- 802, 937 feet E- 1,728, 016 feet GRID ELEMENT 1ft. X 1.0ft.

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4.0 FT.
DEPTH (FT.)

NOTES: (1) Surface is pebble & gravel wash (Probably artificial pebbly Silty sand; Calcareous med-FG sand, 2-10mm Quartzite Clasts (Pebbles), 0-9"

(2) Pebbly Coarse grained Sand, Calcareous, rounded to sub rounded pebbles To silt 10YR 6/6 Compacted

(3) Small Pebbles, coarse grained Sand, Angular Quartzose. Metal fragments at 21 inches (material is probably fill. Calc. 10YR 7/4 No staining, silty Pebbles partly Covered w/Caliche. In Pouch

(4) Proto caliche seam

(5) 27" number 3 unit graded into cobbles Rounded and in Pebbly sandy Matrix. Cement by Caliche to a Proto Conglomerate 2" Rounded Clasts Coarse Quartz Sand up to 3mm diameter matrix clasts

(6) Unit Number 5 Graded into 10" Boulders - digging with the backhoe was not possible due to gravel Boulder proto cemented Material 10YR 7/6

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser No.	HD. SP. (VOA) PPM
S-1	0-6"	ARS 92-201	Negative
S-2	7.0 feet	ARP 92-201	Negative
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

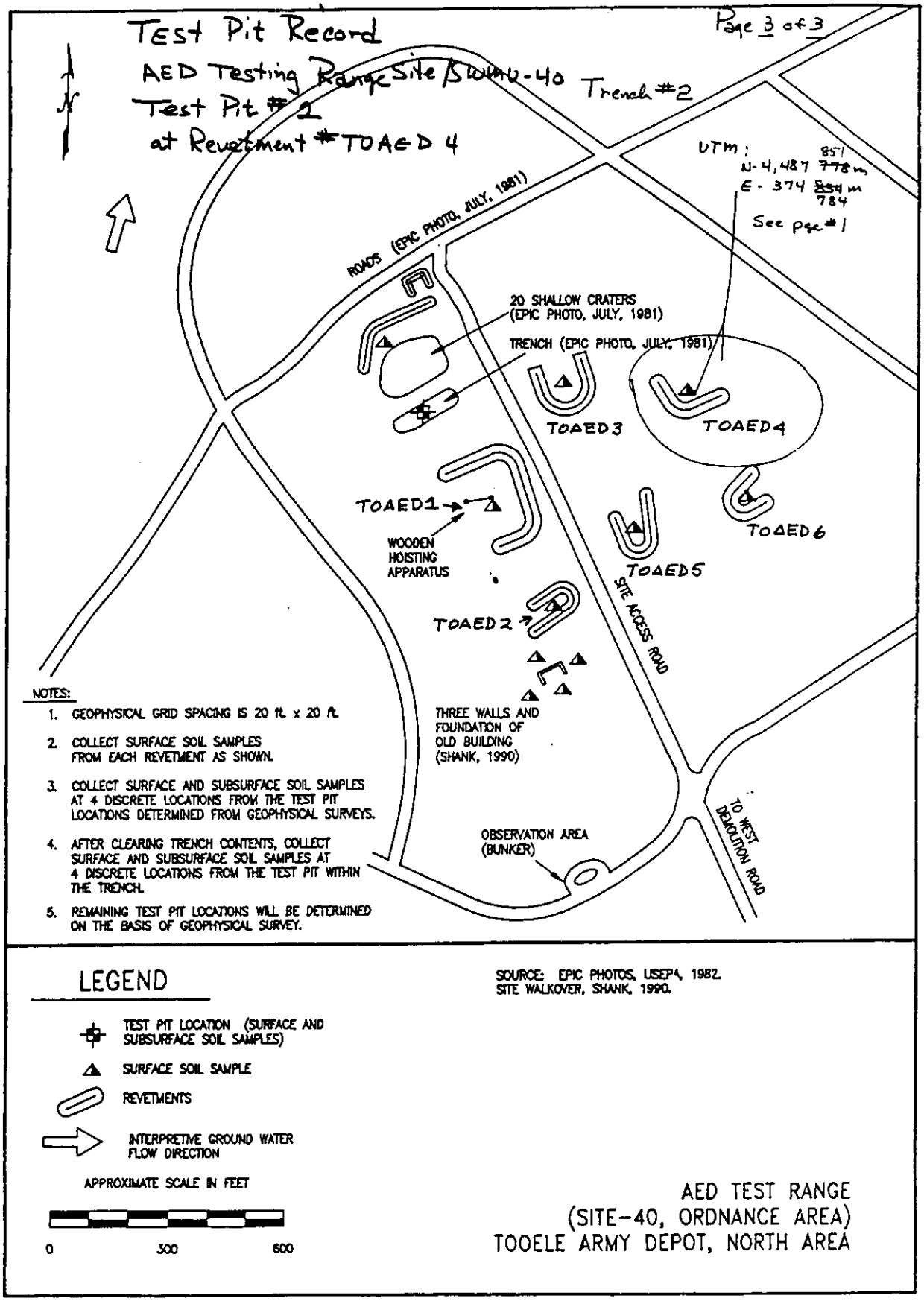
REFERENCE: #3 Field Book, Pg. 44

Attachments AED Test Range Map

SIGNATURE: John A Burger

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA


Test Pit Record
Page 3 of 3
AED Testing Range Site SWMU-40 Trench #2
Test Pit #2
at Revetment #TOAED 4
N
UTM:
N-4,487 857 778 m
E-374 834 m 784
See page #1
ROADS (EPIC PHOTO, JULY, 1981)
20 SHALLOW CRATERS (EPIC PHOTO, JULY, 1981)
TRENCH (EPIC PHOTO, JULY, 1981)
TOAED3
TOAED4
TOAED1
WOODEN HOISTING APPARATUS
TOAED6
TOAED5
TOAED2
SITE ACCESS ROAD
THREE WALLS AND FOUNDATION OF OLD BUILDING (SHANK, 1990)
OBSERVATION AREA (BUNKER)
TO WEST DEMOLITION ROAD
NOTES:
1. GEOPHYSICAL GRID SPACING IS 20 ft. x 20 ft.
2. COLLECT SURFACE SOIL SAMPLES FROM EACH REVETMENT AS SHOWN.
3. COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT LOCATIONS DETERMINED FROM GEOPHYSICAL SURVEYS.
4. AFTER CLEARING TRENCH CONTENTS, COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT WITHIN THE TRENCH.
5. REMAINING TEST PIT LOCATIONS WILL BE DETERMINED ON THE BASIS OF GEOPHYSICAL SURVEY.
LEGEND
TEST PIT LOCATION (SURFACE AND SUBSURFACE SOIL SAMPLES)
SURFACE SOIL SAMPLE
REVETMENTS
INTERPRETIVE GROUND WATER FLOW DIRECTION
APPROXIMATE SCALE IN FEET
0
300
600
SOURCE: EPIC PHOTOS, USEPA, 1982.
SITE WALKOVER, SHANK, 1990.
AED TEST RANGE
(SITE-40, ORDNANCE AREA)
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

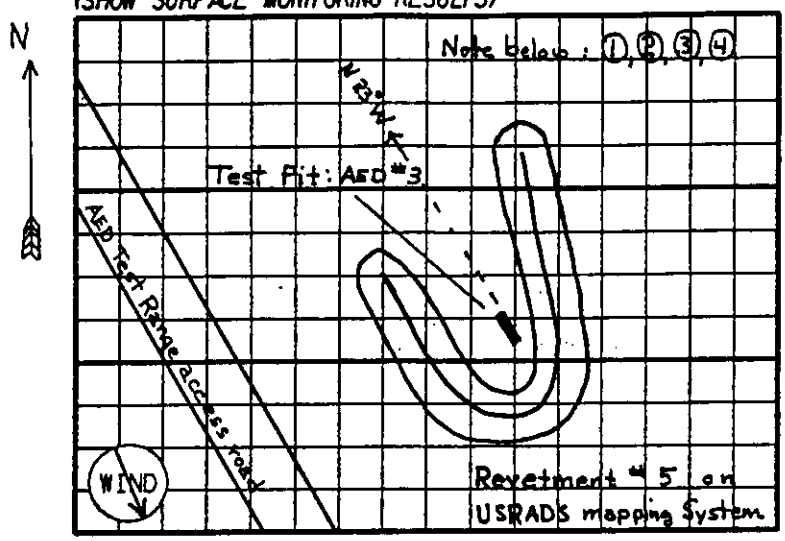
Area View of Test Pit - ARS-92-301 & ARP-92-301 Page 1 of 3

SITE AED TEST RANGE Site 40

TEST PIT AED #3 DATE 8 July 92 TIME 1350 END 1507

COORDINATES State Plane: N - 802,697 feet E - 1,727,754 feet GRID ELEMENT 25 x 25 feet

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 100 FT.

NOTES: (1) See attachment # 1 (Page 3 of 3) for a generalized map of the AED Test Range

(2) Test Pit Demensions are 8ft Length x 3.5 ft Width x 10.0 ft depth.

(3) UTM Coordinates for the center of the pit include coordinates for Samples ARS-92-301 & ARP-92-301 = UTM: (N4,487,725m)(E 374,754m)

(4) Bearing for the pit is N 23° W

CREW MEMBERS:

1. Douglas D Metcalf
2. Denise Dunham
3. Ken Pill
4. JA Burger
5. R. J. Smith
6. Sydney Rodgers
7. Micheal Snerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll #1
John Burger's Camara
Exposure 9, 10, 11

#9 Western face of Trench

10. Southern End of Trench

11. Easter face of trench

12. Northern End of Trench

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

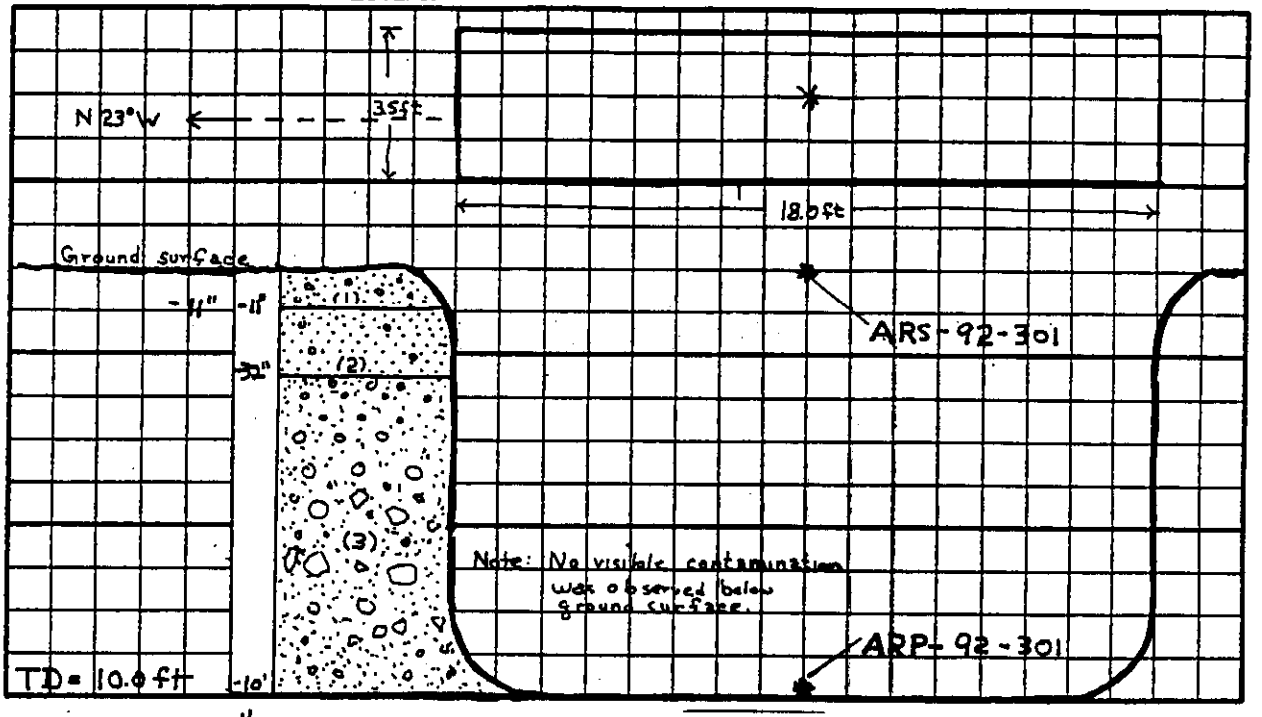
Profile Along Test Pit- AED #3 Page 2 of 3

SITE AED Test Range Site 40

TEST PIT AED #3 DATE 8 July 1992 TIME 1350 END 1507

COORDINATES - State Planer: N 802,697 ft E 1,727,754 ft GRID ELEMENT 1 X 1 feet

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4 FT.
DEPTH (FT.)

NOTES:

1) silty, sandy, pebbly gravel. Clasts up to 4cm. calc., frags of wood charcoal, rootletr. 10YR 4/3 poorly sorted; gravel clasts chiefly qtzite. 11" thick
2) silty, med gr. sand; 10YR 6/4; calc; tr rounded pebbles, up to 12 mm.; lower contact at 32";
3) silty, m. gr. sand (x) gravel; clasts 2-12cm 10YR 7/3 calc. matrix, caliche not present; chiefly qtzite boulders, rounded to sub rounded grades down to larger clasts to 6 feet deep, then clasts become smaller to total depth of 10 ft

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	ARS-92-3	01-Surface	- Negative
S-2	ARP-92-3	01-10.0 ft	- Negative
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: #3 Field Book, Pg. 44

Attachments #1

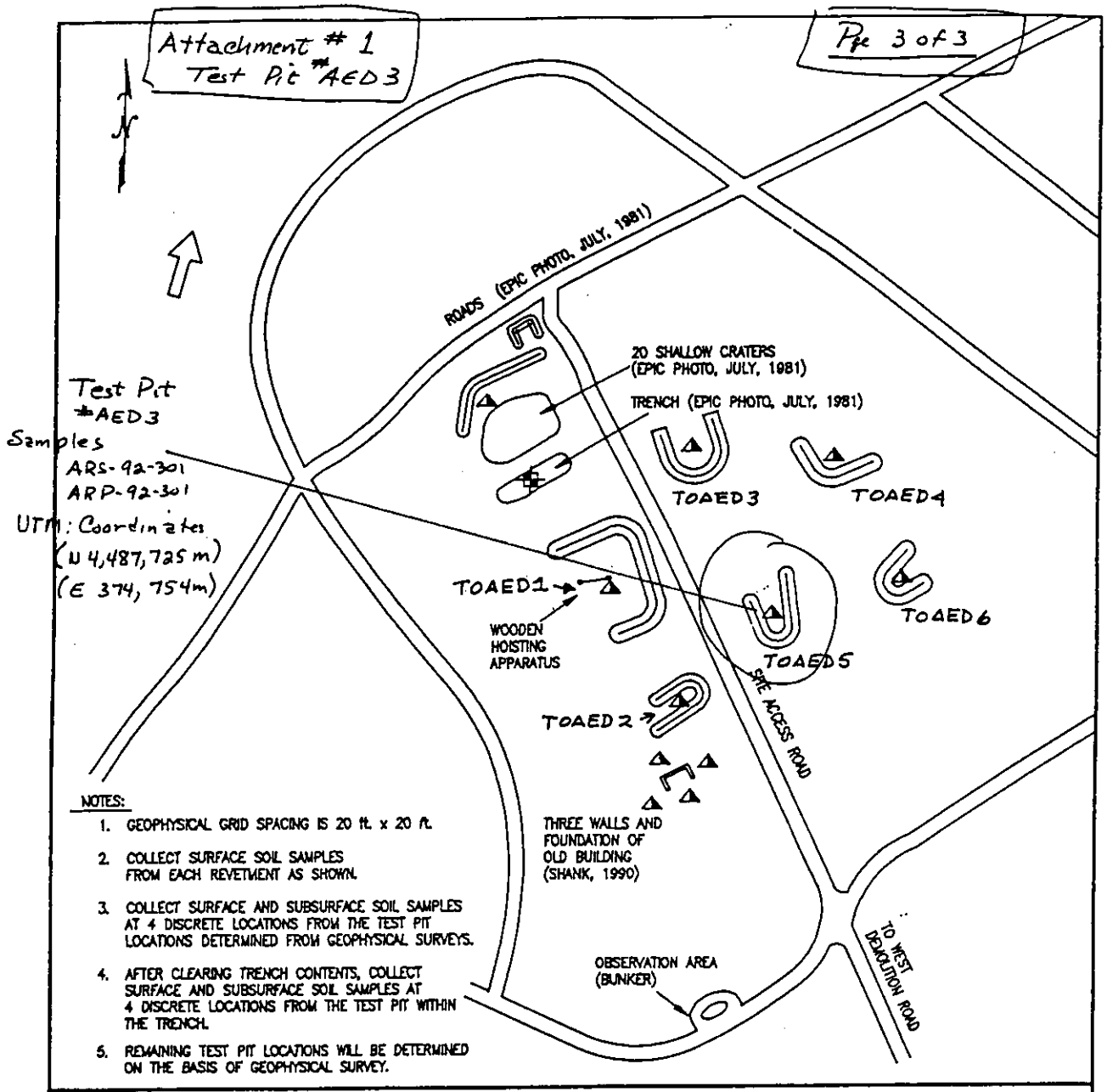
SIGNATURE: John A. Burger

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

Attachment # 1
Test Pit *AED3

Pge 3 of 3



NOTES:

1. GEOPHYSICAL GRID SPACING IS 20 ft. x 20 ft.
2. COLLECT SURFACE SOIL SAMPLES FROM EACH REVETMENT AS SHOWN.
3. COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT LOCATIONS DETERMINED FROM GEOPHYSICAL SURVEYS.
4. AFTER CLEARING TRENCH CONTENTS, COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT WITHIN THE TRENCH.
5. REMAINING TEST PIT LOCATIONS WILL BE DETERMINED ON THE BASIS OF GEOPHYSICAL SURVEY.

LEGEND

- TEST PIT LOCATION (SURFACE AND SUBSURFACE SOIL SAMPLES)
- SURFACE SOIL SAMPLE
- REVETMENTS
- INTERPRETIVE GROUND WATER FLOW DIRECTION

APPROXIMATE SCALE IN FEET

0 300 600

SOURCE: EPIC PHOTOS, USEPA, 1982.
SITE WALKOVER, SHANK, 1990.

Test Pit Record
AED Testing Ranges Site/SWMU-40
Test Pit *AED 2
Revetment # TOAED 2 on USRADS Numbering System

AED TEST RANGE
(SITE-40, ORDNANCE AREA)
TOOELE ARMY DEPOT, NORTH AREA

TEST PIT RECORD

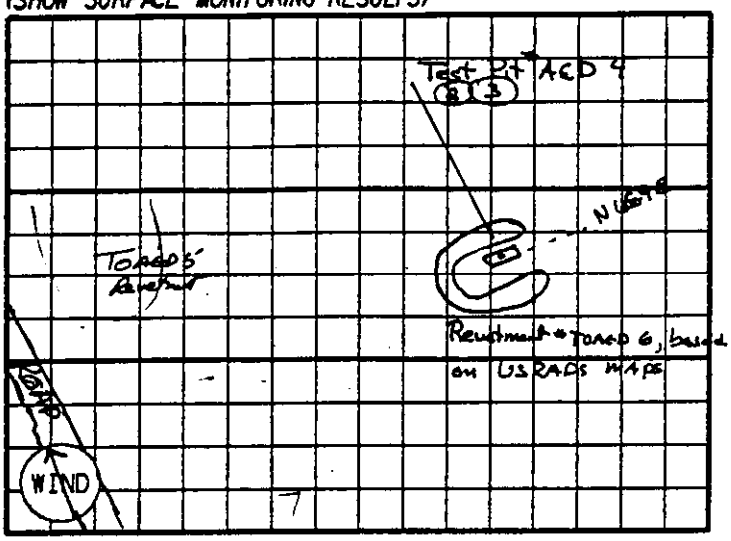
Area View of Test Pit - ARS-92-401 & ARP-92-401, 402 Page 1 of 84

SITE AED Test Range Site / SWMU-40

TEST PIT # AED 4 DATE 9 July 1992 TIME 0846 hrs END 1235 hrs

COORDINATES ~~UTM (N4,487,696) (E374,832) m~~ (N 4,487,788) (E 374,803) m 8/18/92 GRID ELEMENT 40 ft x 40 ft

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 160 FT.

NOTES: (1) See Attachment #1 which is a generalized map of The AED Test Range.
(2) The Test Pit demensions are 21.0 ft Length X 3.5 ft width X 10 ft depth. Its coordinates on Utm are (N 4,487,696m)(E 374,832m)
(3) Strike Bearing for the Pit is N 66° E

FG = Fine Grained
Tr = Trace
Sli = Slightly
Qtzse = Quartzose

CREW MEMBERS:
1. Douglas D. Metcalf
2. Denise Dunham
3. Ken Pill
4. J.A. Burger
5. R.T. Smith
6. Sydney Rodgers
7. Michael Smerling

MONITOR EQUIPMENT:

PI Meter	(Y)	N
Explosive Gas	(Y)	N
Avail. Oxygen	(Y)	N
OVA	Y	(N)

Other

Photographs, Roll # 1
John Burger's Camara
Exposure 13, 14, 15, 16, 17, & 18

13. West side of pit (see Attachment #2
14. Metal Debris from pit
15. down middle of Trench
16. Northwest face of Trench
17. Close-up of S.E. face of Trench
18. Scrap from hole

TEST PIT PLAN RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

1682FR01.DGN

TEST PIT RECORD

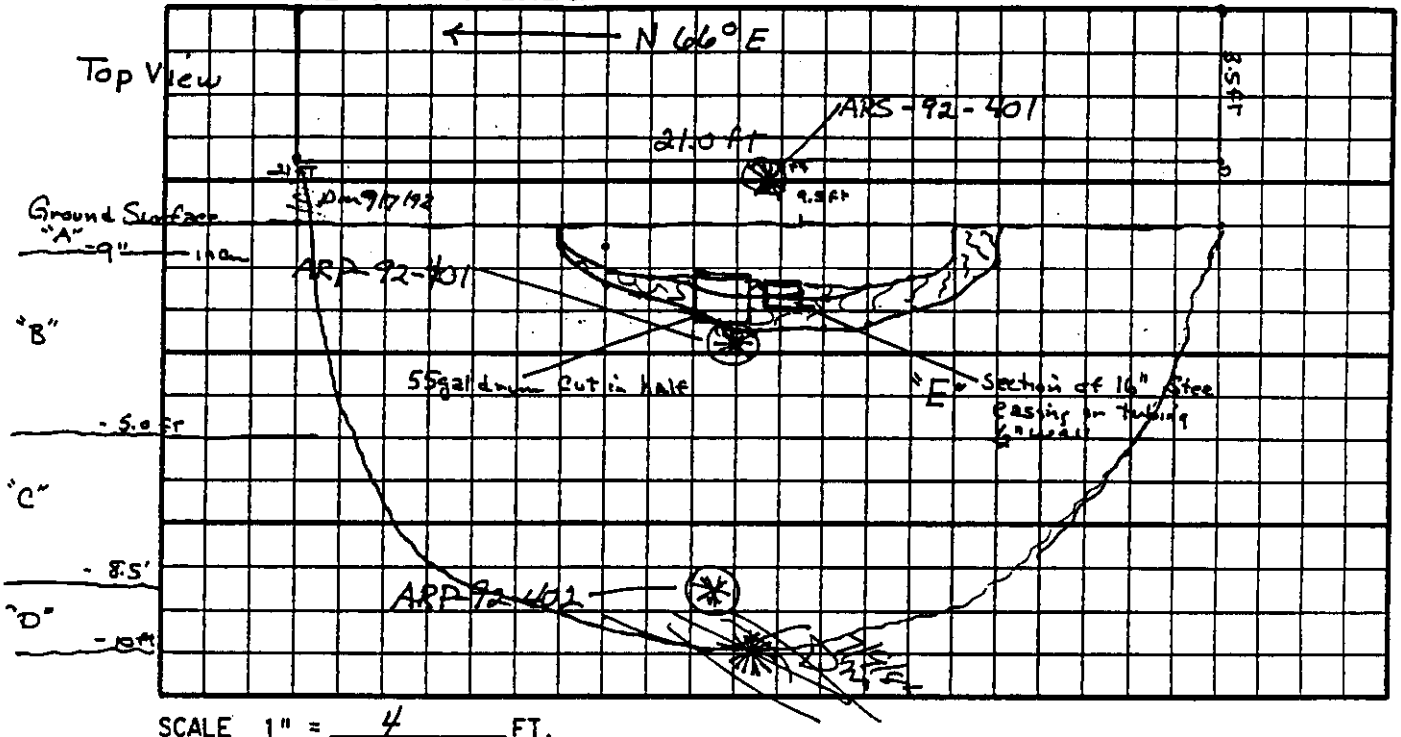
Profile Along Test Pit - ARS-92-401 & ARP-92-401, 401, 402 Page 2 of 4

SITE AED TEST Range

TEST PIT # AED 4 DATE 9 July 1992 TIME 0846 hrs END 1235 hrs

COORDINATES UTM (N 4,487,696) (E 374,832m) GRID ELEMENT 1FT X 1FT

SKETCH OF TEST PIT CROSS SECTION
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 4 FT.
DEPTH (FT.)

SAMPLES OBTAINED:

No.	Depth (ft.)	Int. Ser. No.	HD. SP. VOA PPM
S-1	Surface	ARS-92 401	Negative
S-2	32 inches	ARP-92 401	Negative
S-3	8.5 ft	ARP-92 402	Negative
S-4			
S-5			
S-6			
S-7			
S-8			

NOTES: Burned Staining, Ash material, = [illegible] = metal debris, consisting of burned or dismantled 3.5" rockets, 115mm rockets, various cartridge case, Ammo cases, rocket motor parts, large fragments of Shrapnel

"A") Silty sand, pebbly gravel: Sand is FG, Pebbles are 4mm - 50mm discoid - Shenical shape. Matrix is calcareous. Note: this is Engineered fill x9" thick

"B") Clayey silty Sand: Calcareous grains Coatings, mostly ~~Quartzose~~ from Quartzose sand, Tr of black minerals (Ferro. Mag. ?). Color = 10 YR 6/4 = Light Yellowish Brown. Sample ARP-92-401 at 32" Sample Material Sli Stained

"C") Sli silty sandy pebble gravel: At 5ft deep grades into 10" boulders. At 8.5 ft grades into finer matter. Between 6.5'ft and 6'10" it is Iron Stained as in Limonite

("D") Finer Grained group "e" material (Continued on back of Page

REFERENCE: #3 Field Book, Pg. 45, 46

Attachments #1, #2

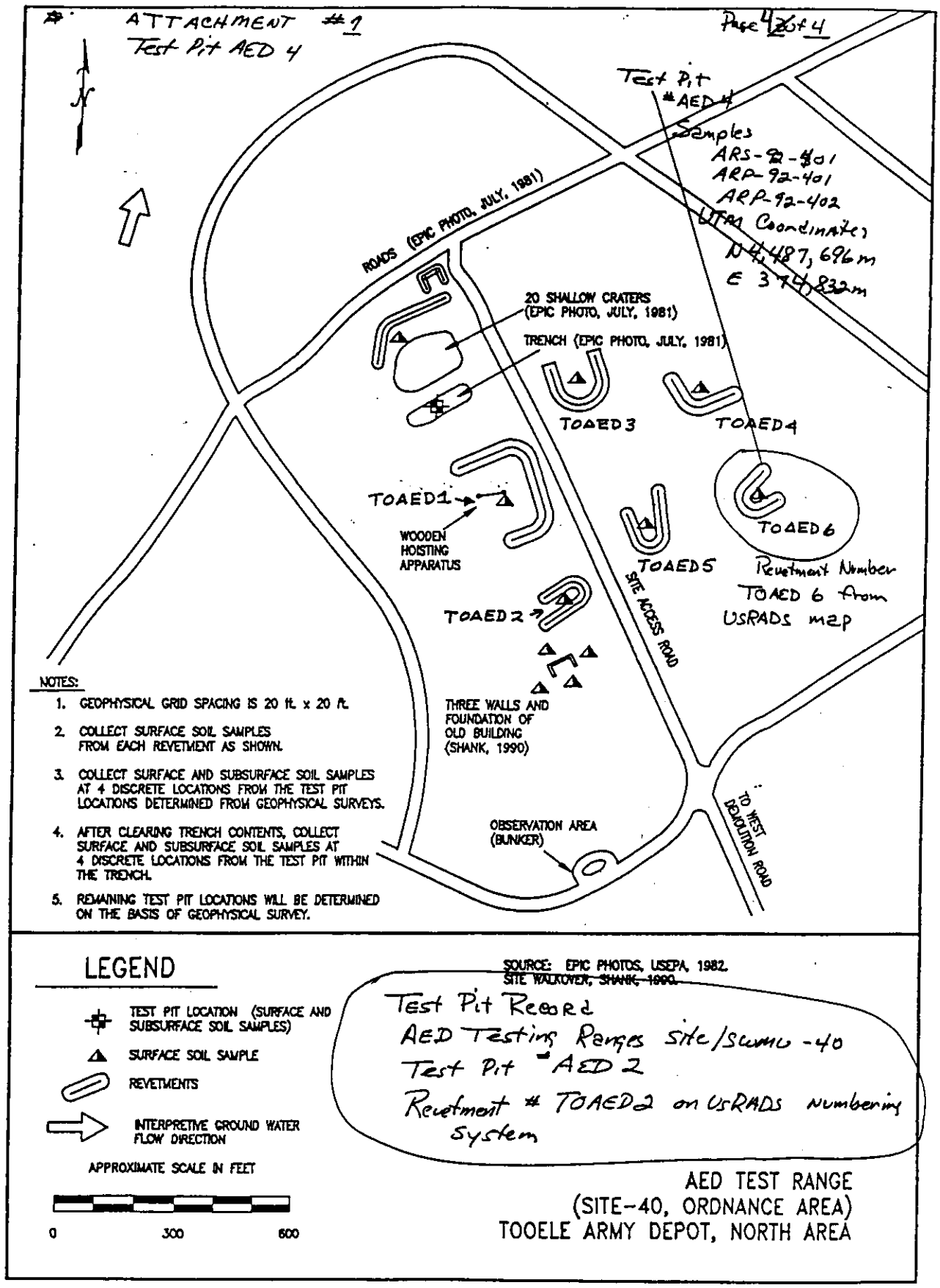
SIGNATURE: [signature]

1682FR01.DGN

TEST PIT PROFILE RECORD
REMEDIAL INVESTIGATION FIELD SAMPLING PLAN
TOOELE ARMY DEPOT, NORTH AREA

"D" Continued 8.5ft Silty sand, Qtzose, med - F G; Tr Quartz pebbles Approximately 10 mm dia, rounded, NOT CALCAREOUS! Appears To be clean. Sediment test Shows very little silt and clay. Color: 2.5y 7/6 : Yellow

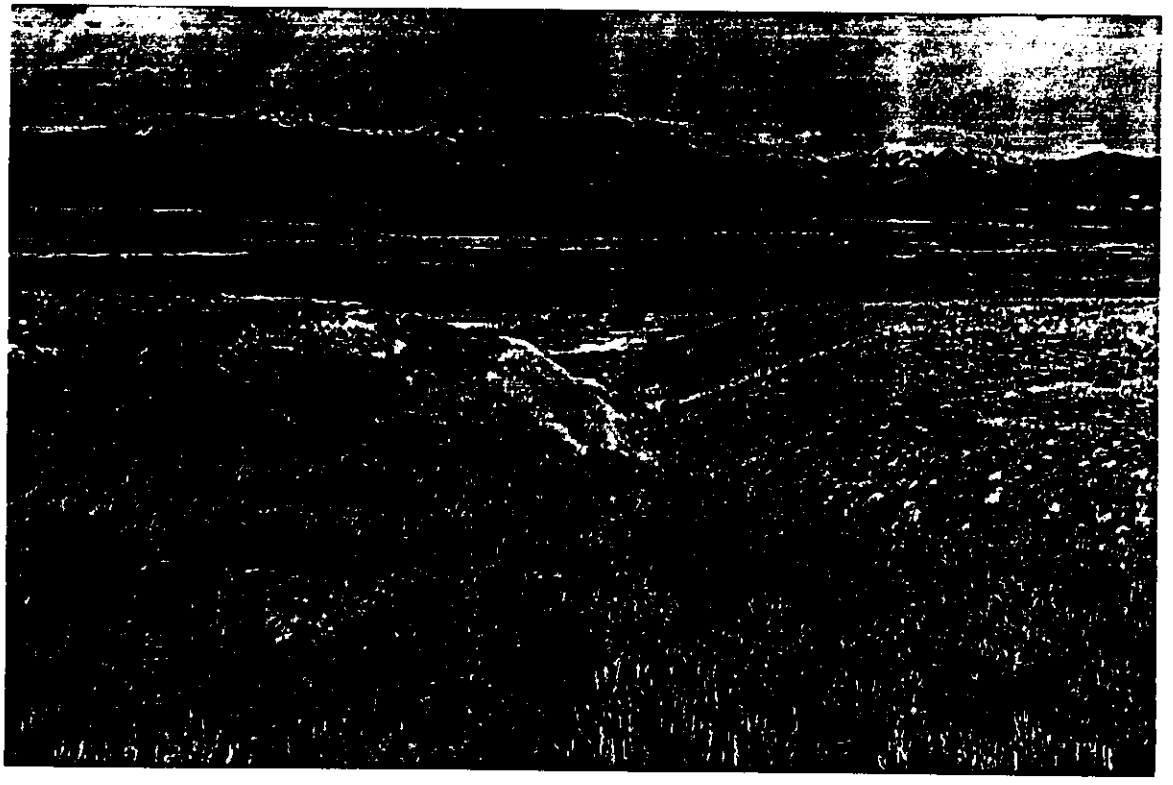
"E" Uncovered 10-15 cm size fragments of metal at the Surface (ARS-92-401) sample site. Subsequent digging uncovered several more metal fragments up 50 cm at ≈ 1ft depth. These consist of pieces of steel casing & one half of a 55gal drum at 17" and 16" respectively. The casing diameter is Approximately 17" diameter. (See Picture #13 of Roll #1 from John burgers camera.


ATTACHMENT #1
Test Pit AED 4
Page 4 of 4
N
Test Pit #AED 4
Samples
ARS-92-401
ARP-92-401
ARP-92-402
UTM Coordinates
N 4,487,696 m
E 374,832 m
ROADS (EPIC PHOTO, JULY, 1981)
20 SHALLOW CRATERS (EPIC PHOTO, JULY, 1981)
TRENCH (EPIC PHOTO, JULY, 1981)
TOAED3
TOAED4
TOAED1
WOODEN HOISTING APPARATUS
TOAED6
TOAED5
Revetment Number TOAED 6 from USRADS map
TOAED2
SITE ACCESS ROAD
THREE WALLS AND FOUNDATION OF OLD BUILDING (SHANK, 1990)
OBSERVATION AREA (BUNKER)
TO WEST DEMOLITION ROAD
NOTES:
1. GEOPHYSICAL GRID SPACING IS 20 ft. x 20 ft.
2. COLLECT SURFACE SOIL SAMPLES FROM EACH REVETMENT AS SHOWN.
3. COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT LOCATIONS DETERMINED FROM GEOPHYSICAL SURVEYS.
4. AFTER CLEARING TRENCH CONTENTS, COLLECT SURFACE AND SUBSURFACE SOIL SAMPLES AT 4 DISCRETE LOCATIONS FROM THE TEST PIT WITHIN THE TRENCH.
5. REMAINING TEST PIT LOCATIONS WILL BE DETERMINED ON THE BASIS OF GEOPHYSICAL SURVEY.
LEGEND
TEST PIT LOCATION (SURFACE AND SUBSURFACE SOIL SAMPLES)
SURFACE SOIL SAMPLE
REVETMENTS
INTERPRETIVE GROUND WATER FLOW DIRECTION
APPROXIMATE SCALE IN FEET
0
300
600
SOURCE: EPIC PHOTOS, USEPA, 1982.
SITE WALKOVER, SHANK, 1990.
Test Pit Record
AED Testing Range site/Scenario -40
Test Pit #AED 2
Revetment # TOAED2 on USRADS numbering system
AED TEST RANGE
(SITE-40, ORDNANCE AREA)
TOOELE ARMY DEPOT, NORTH AREA

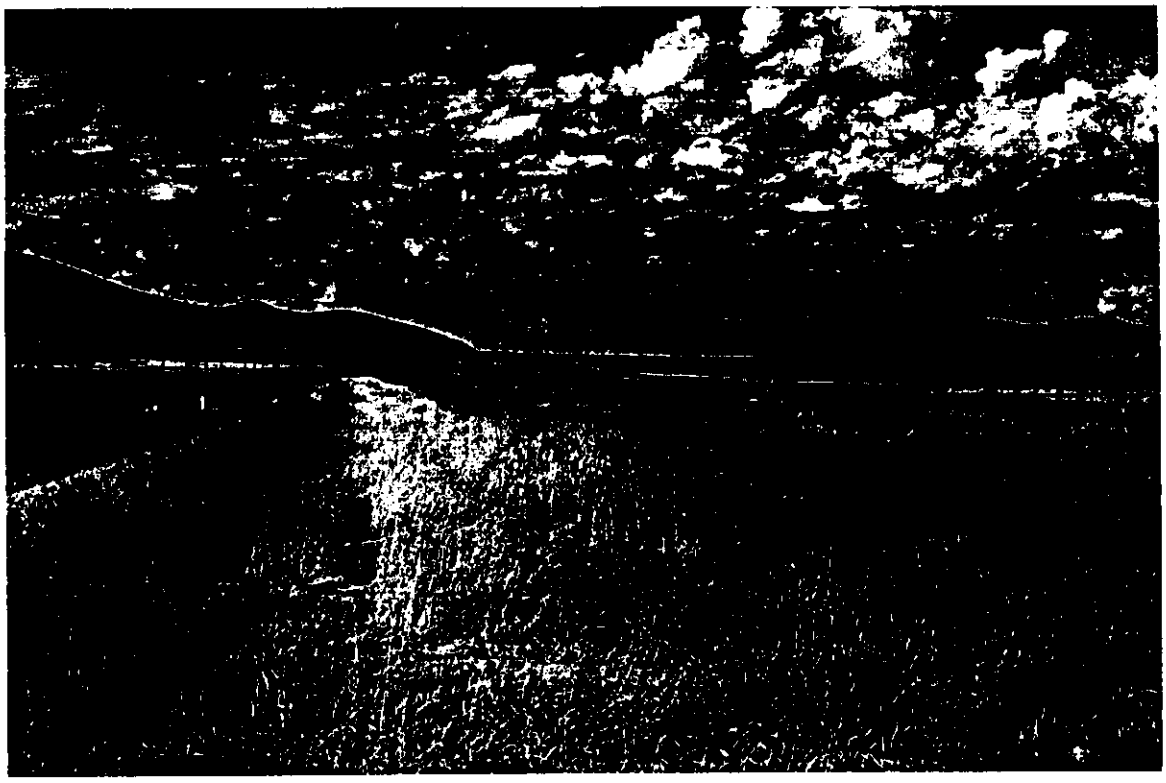
APPENDIX D

SITE PHOTOGRAPHS

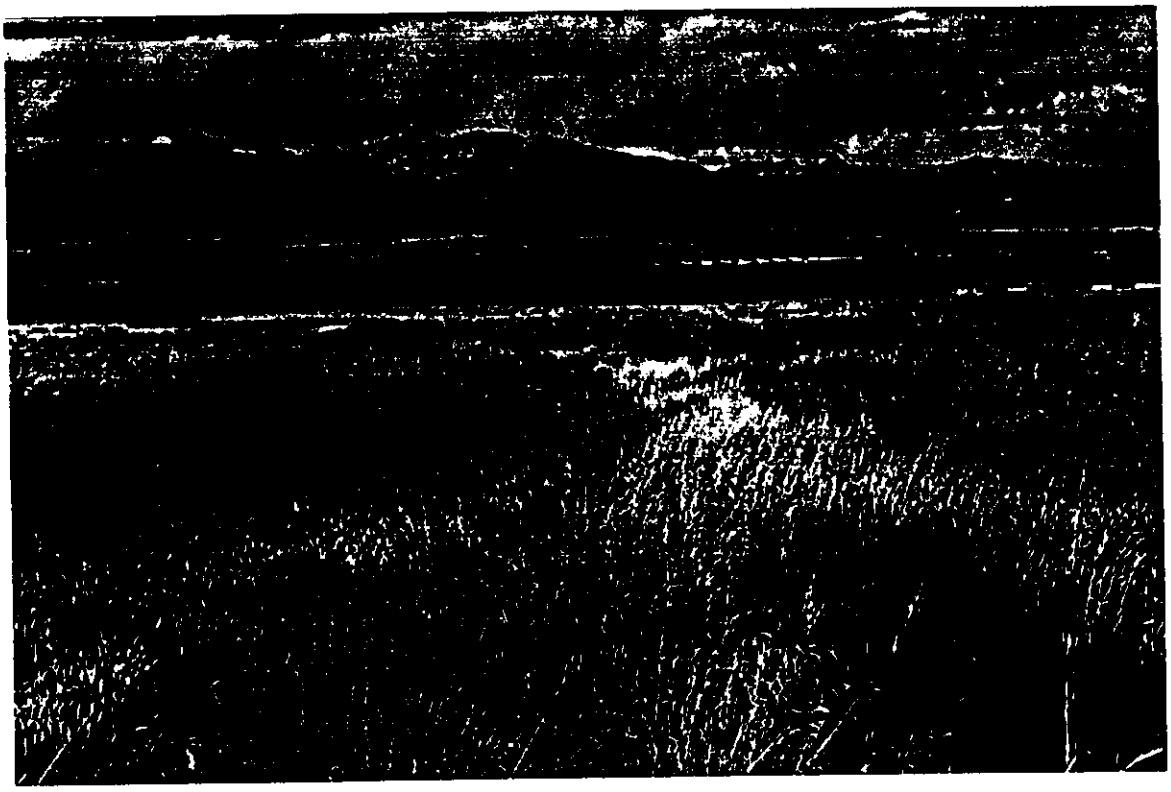
Wastewater Spreading Area, Site 35 (lower ditch area prior to entering ravine)



Wastewater Spreading Area, Site 35 (ravine and spreading area (trees) looking west)



Wastewater Spreading Area, Site 35 (upper ditch area looking south)



Wastewater Spreading Area, Site 35 (mid-ditch area looking north)

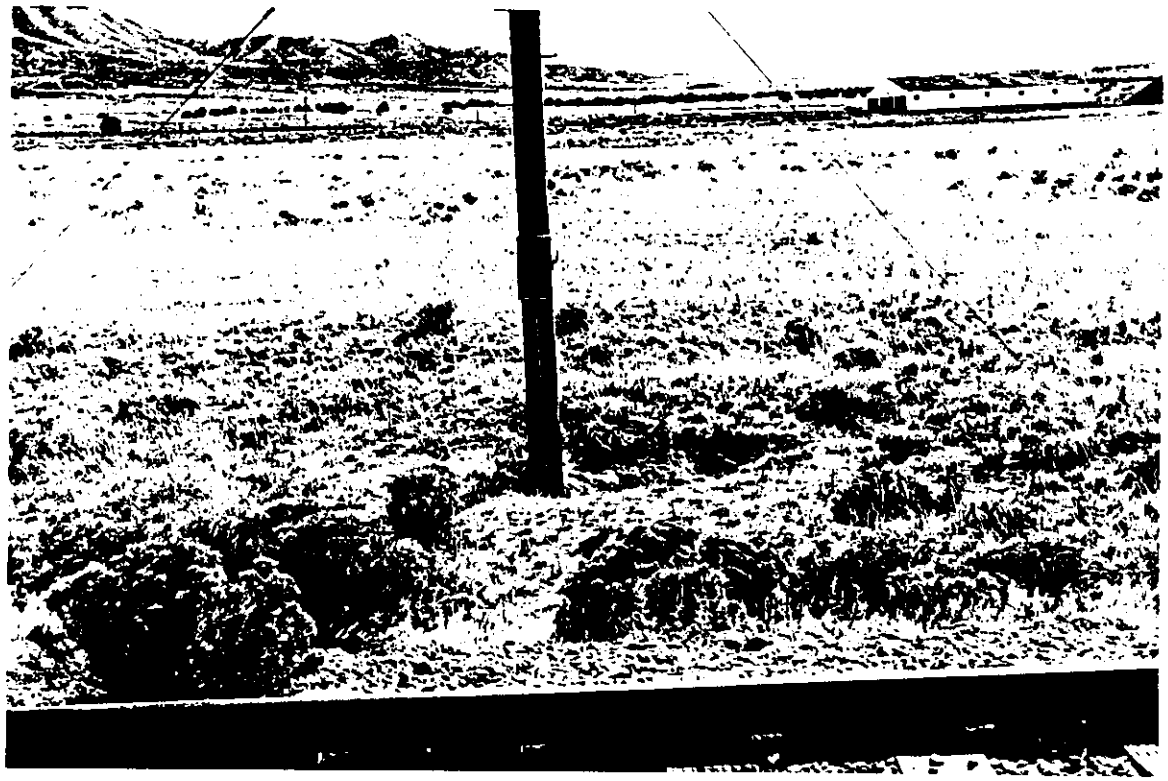
Tire Disposal Area, Site 13 (taken from pit floor in northeastern corner looking southwest)

Tire Disposal Area, Site 13 (nature of the pit floor in an open area of the disposal site)

Tire Disposal Area, Site 13 (general view of gravel pit from southwestern corner looking northeast)

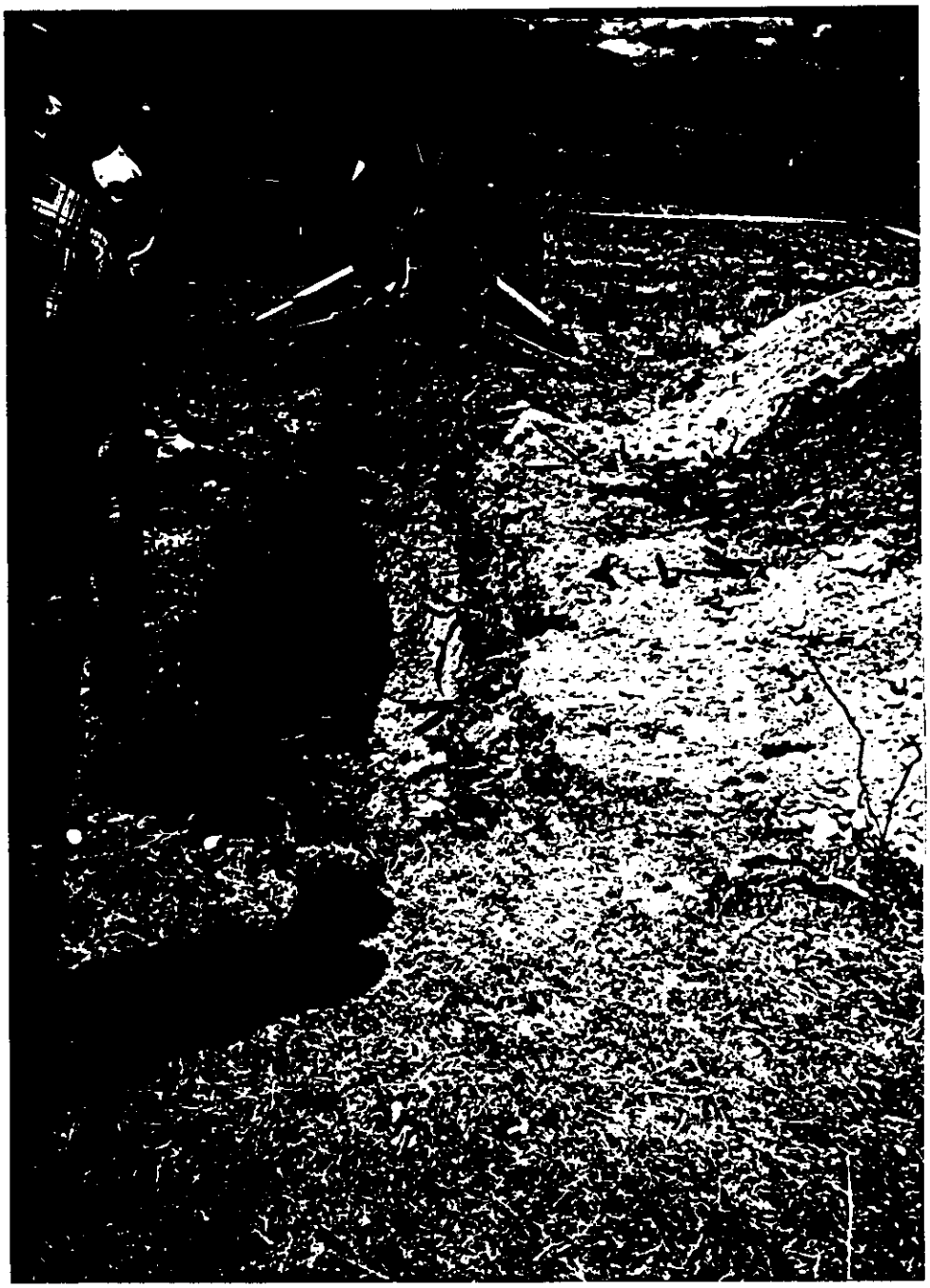
Tire Disposal Area, Site 13 (southern bank of pit looking north)

Pole Transformer PCB Spill, Site 5 (pole and sample locations looking east)



Pole Transformer PCB Spill, Site 5 (former excavation adjacent to pole looking west)

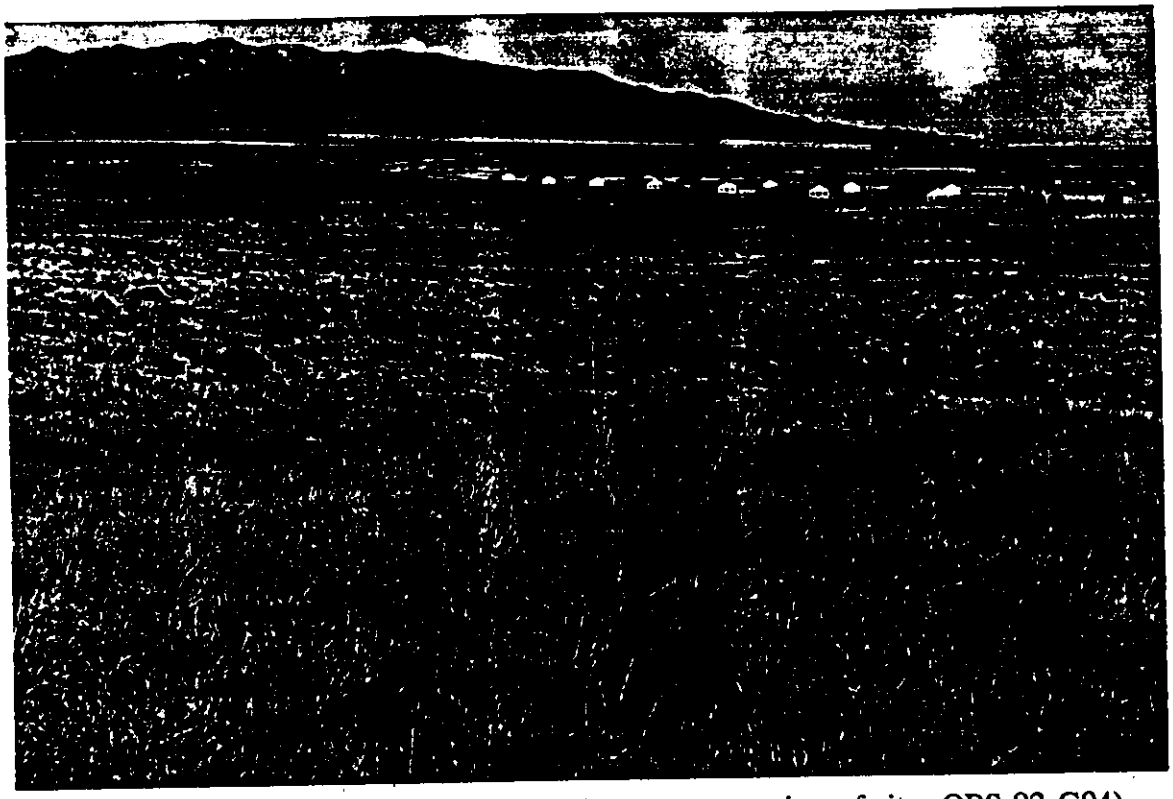
Old Burn Area (Test Pit No. 1 Exclusion Zone)



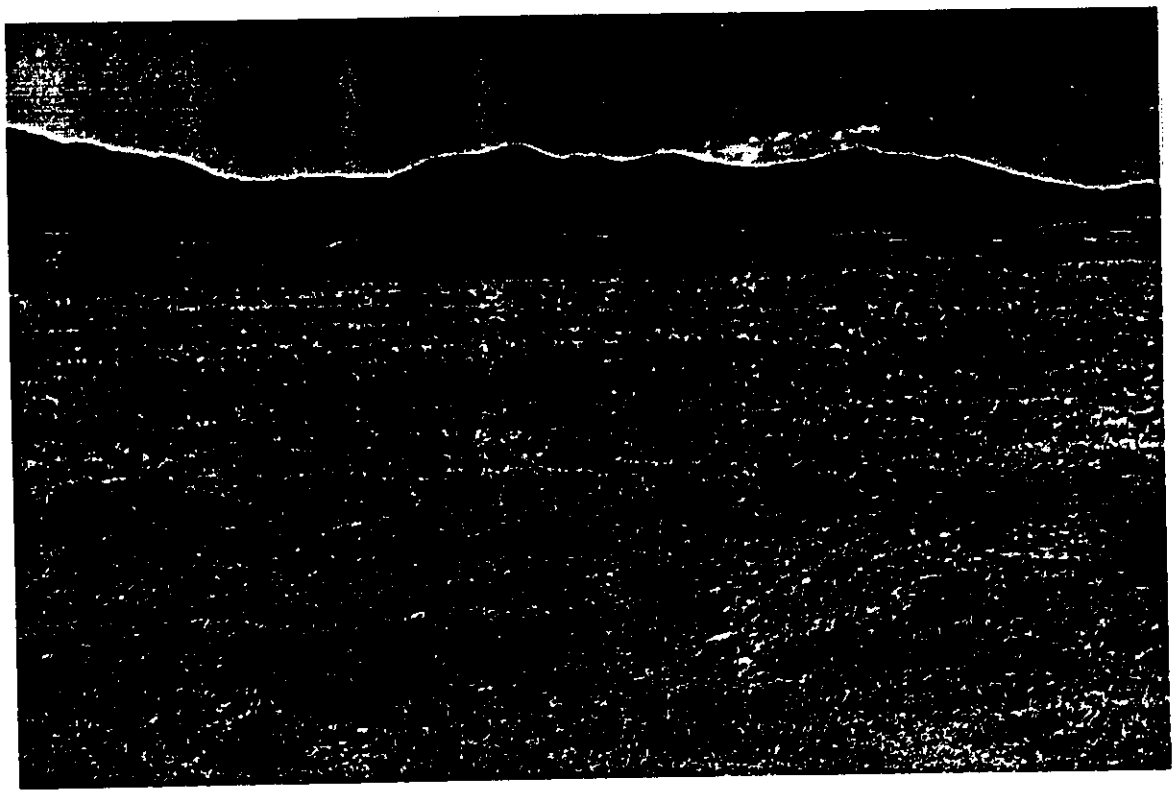
Old Burn Area (Test Pit No. 1)

Old Burn Area (Test Pit No. 1 Sampling)

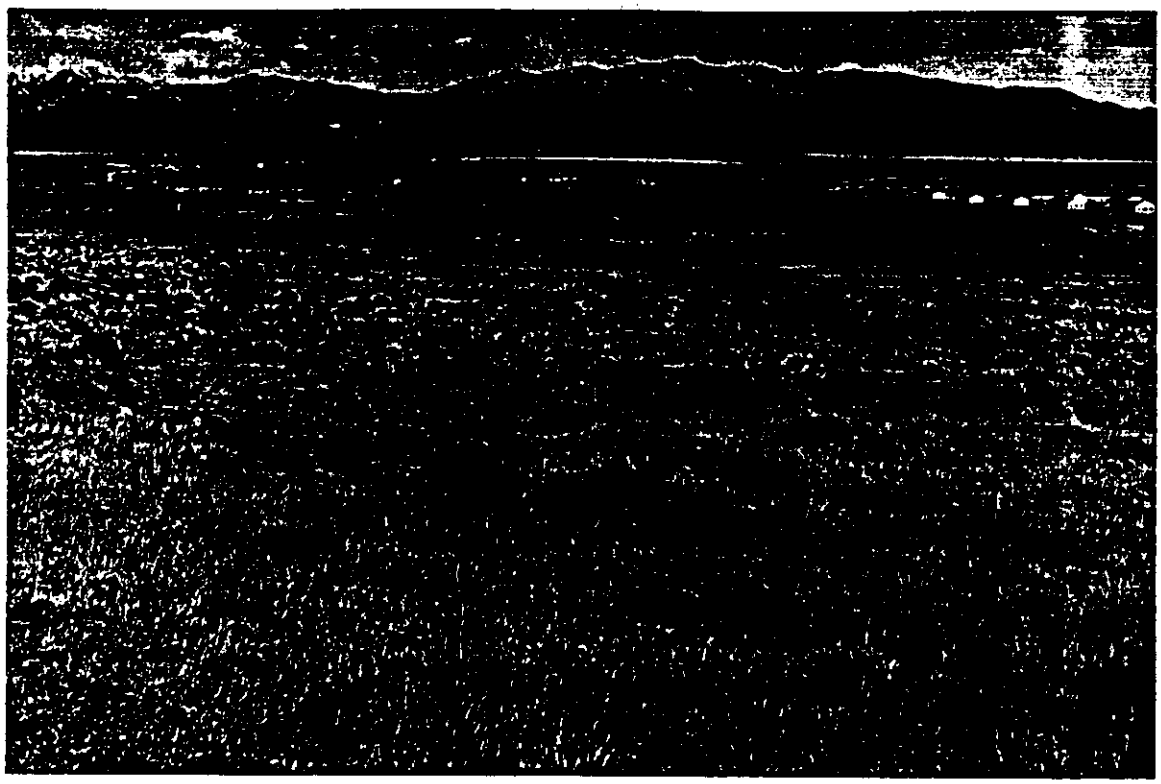
Old Burn Area (Test Pit No. 2)



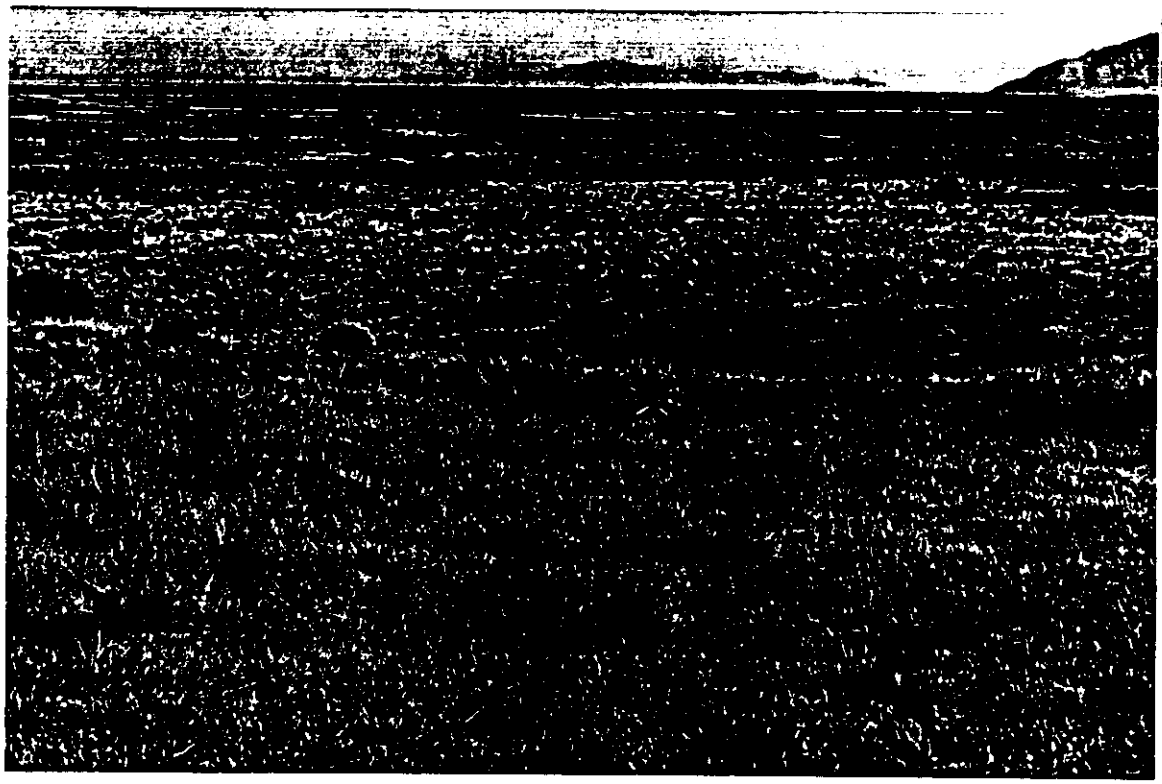
Old Burn Area, Site 6 (gully location in western portion of site, OBS-92-G04)



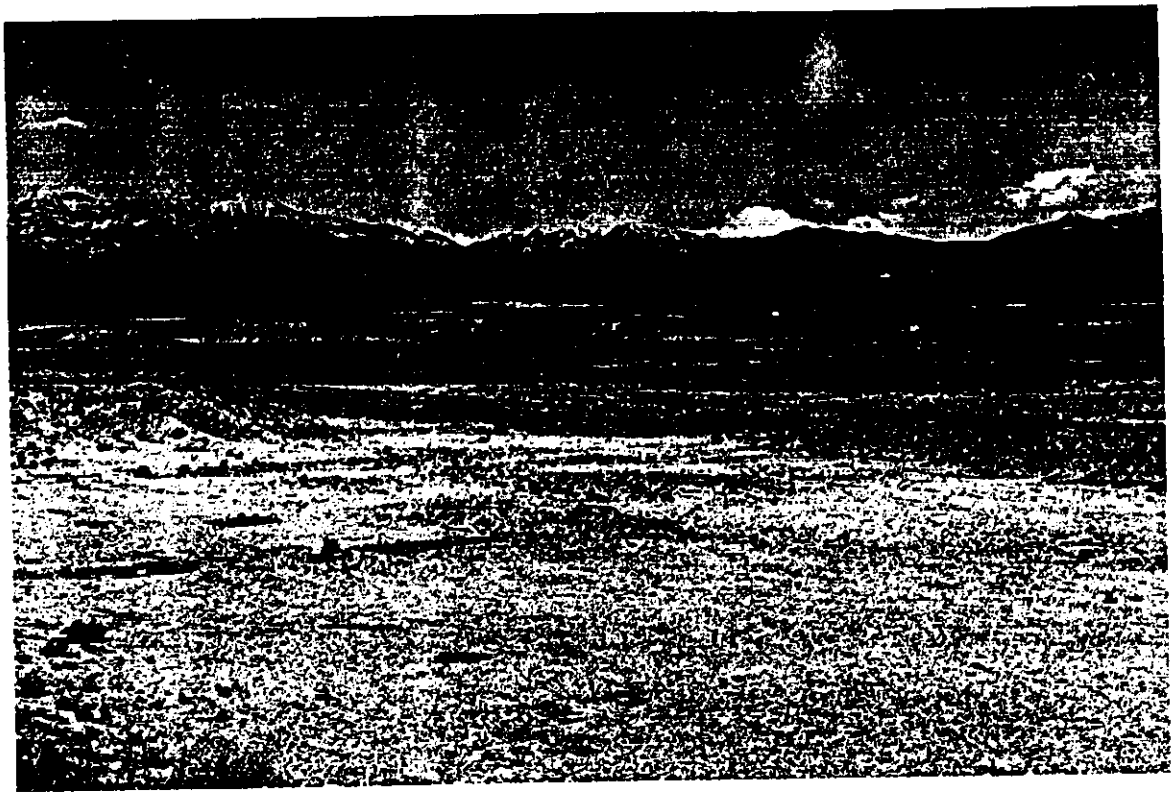
Old Burn Area, Site 6 (sample location adjacent to culvert in man-made ditch, OBS-92-G05)



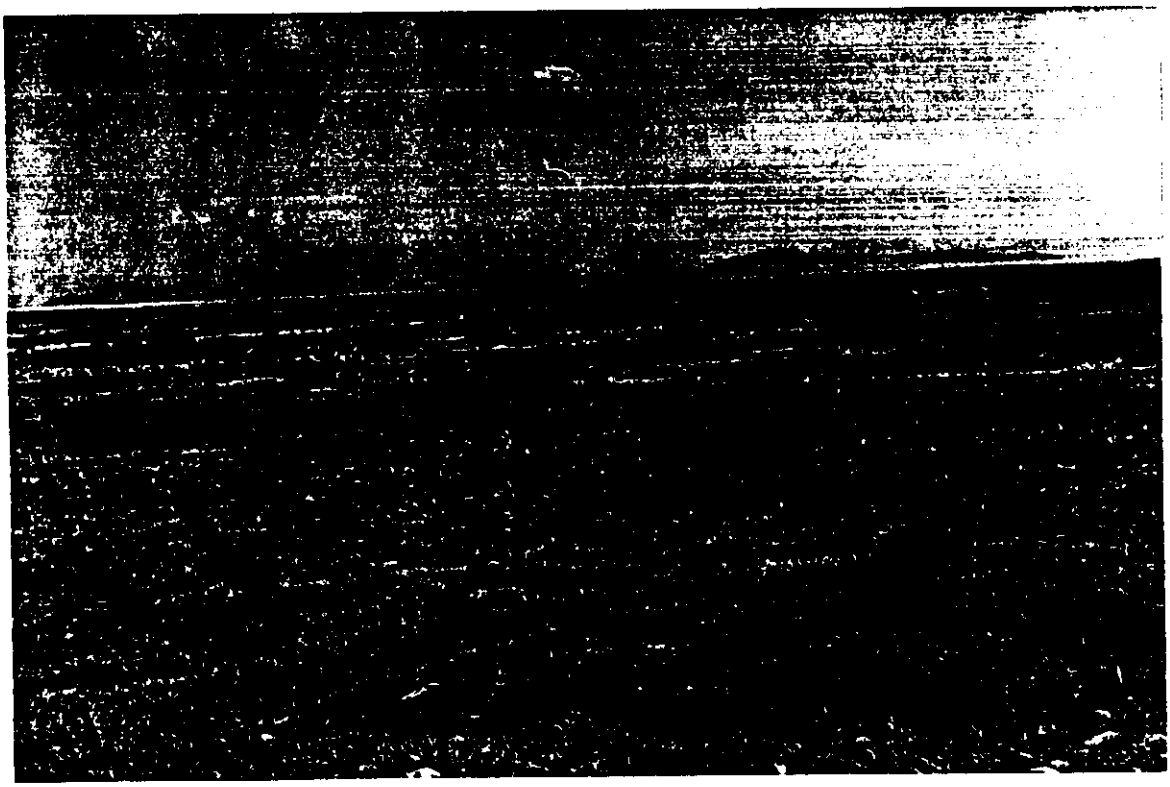
Old Burn Area, Site 6 (gully sample location on eastern portion of site, OBS-92-G01)



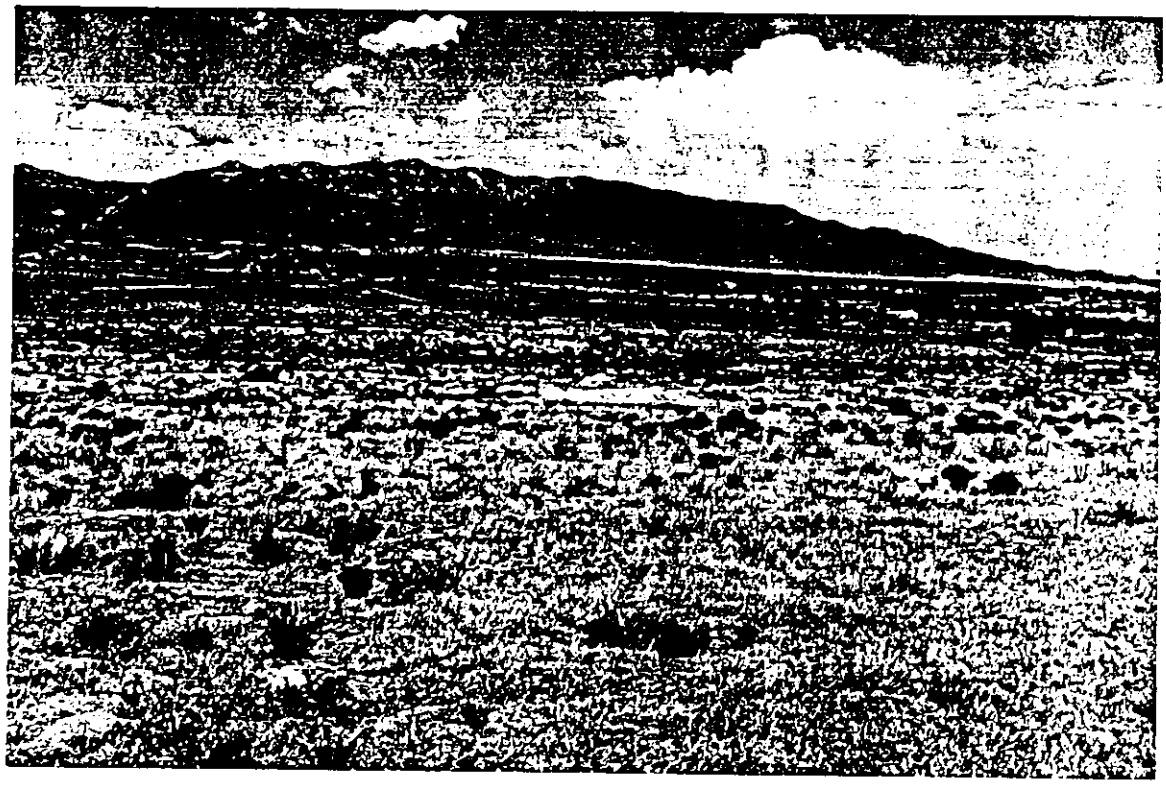
Old Burn Area, Site 6 (gully sample location at head on man-made ditch, OBS-92-G02)



Old Burn Staging Area, Site 36 (floor of gravel pit; note stained area near center of pit)

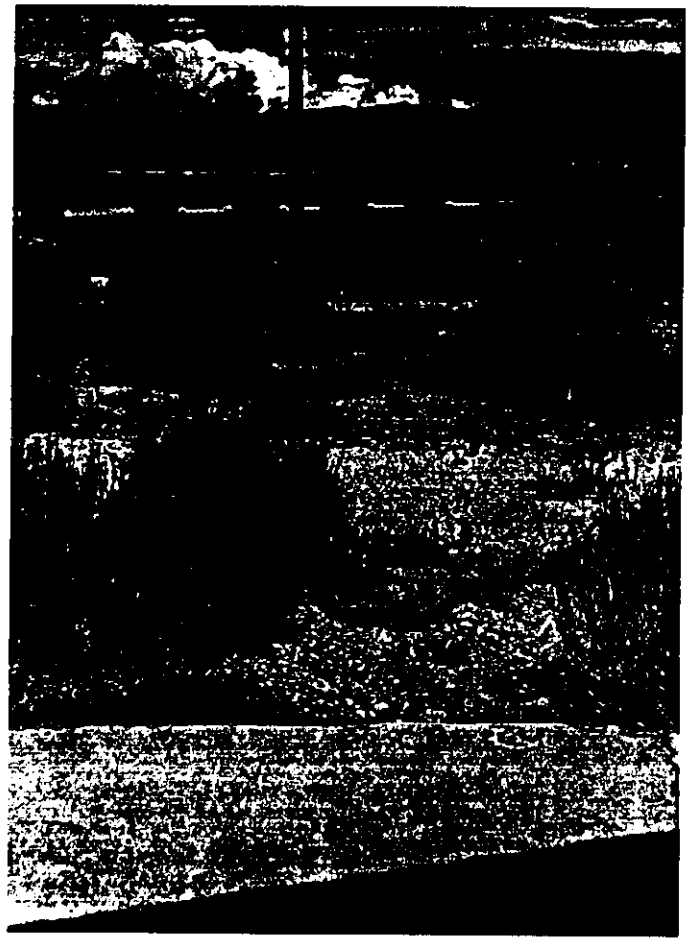


Old Burn Staging Area, Site 36 (berm of pit looking north to burn areas; note metal banding and wood debris)



Chemical Range, Site 7 (former trench area following closure of trenches from concrete pad looking northwest)

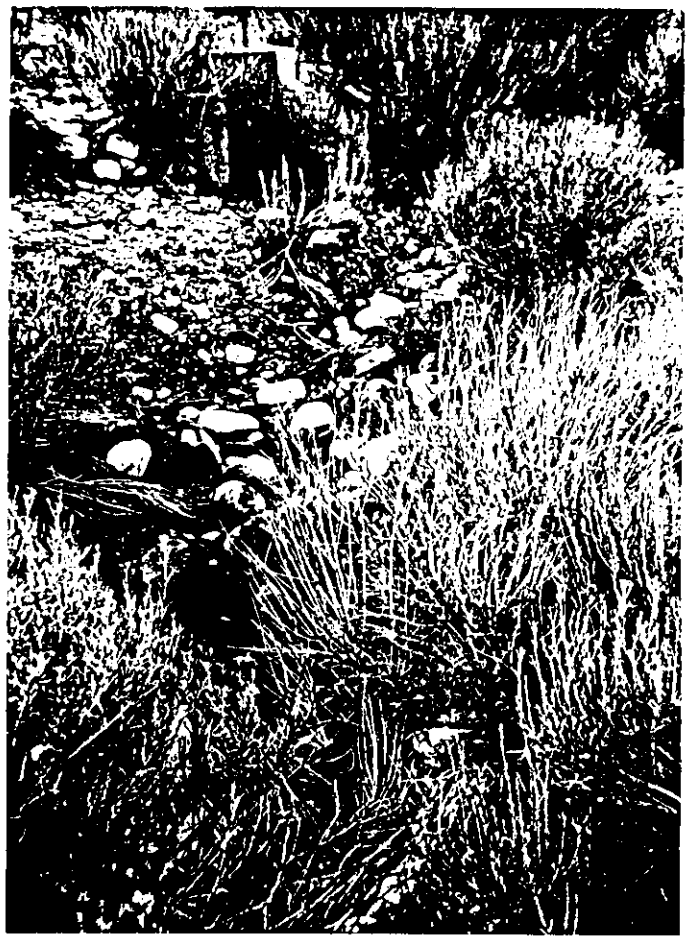
Chemical Range, Site 7 (Test Pit No. 1 showing metal debris)



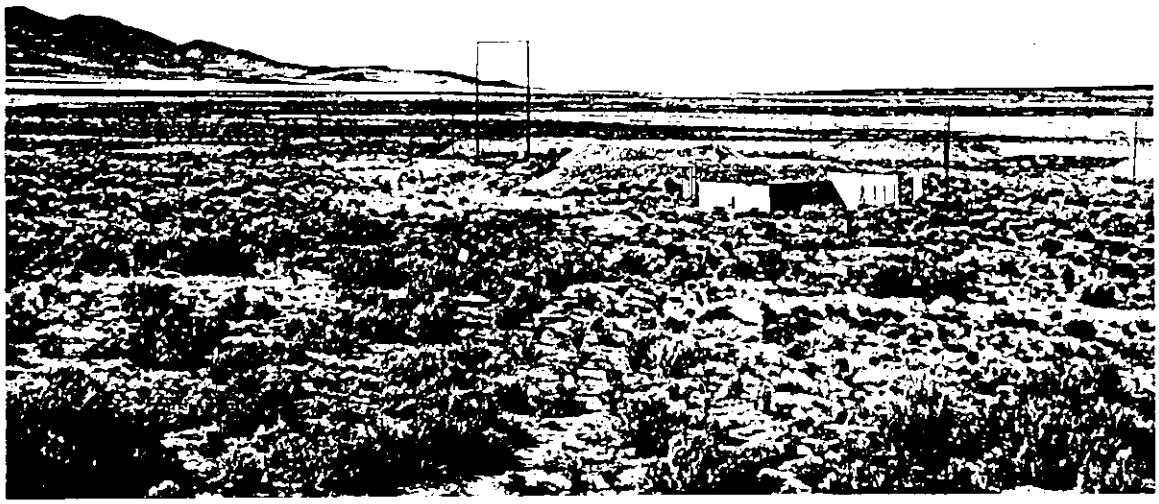
Building 1303 Washout Pond, Site 22 (from Building 1303 looking east showing stained area, small depression, and spreading area)

Building 1303 Washout Pond, Site 22 (stained soil area adjacent to concrete pad east of Building 1303.

Building 1303 Washout Pond, Site 22 (sample area east of depression (pond))



Bomb and Shell Reconditioning Building, Site 23 (wastewater discharge area)



AED Test Range, Site 40 (from observation bunker looking northwest to building foundation and drop tower)

AED Test Range, Site 40 (Revetment Area from observation bunker looking north)

AED Test Range, Site 40 (Revetment No. 4 Test Pit)

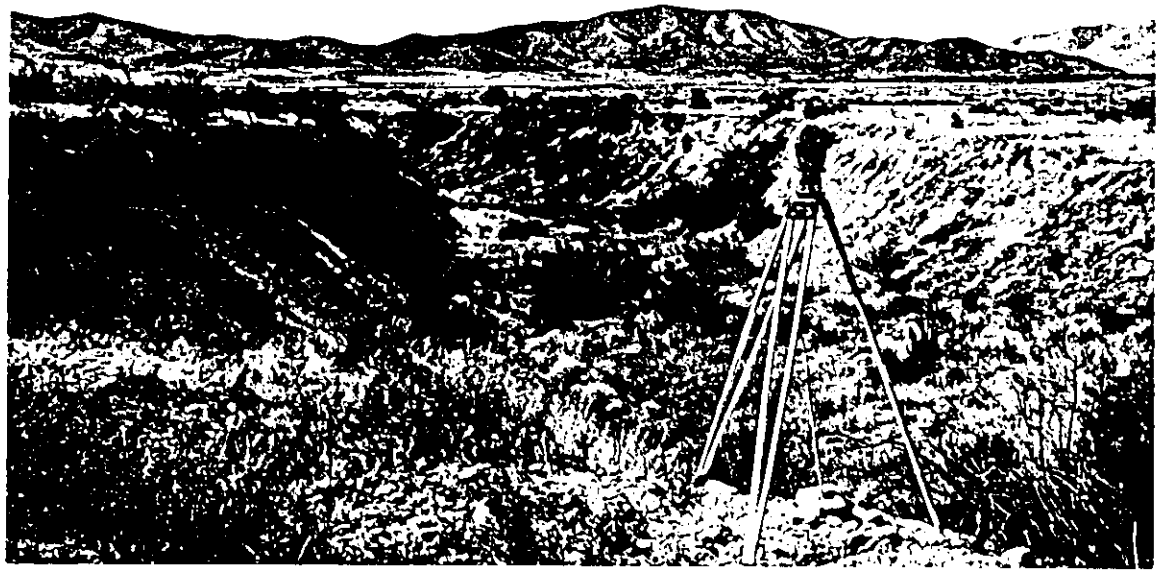
AED Test Range, Site 40 (Revetment No. 6 Test Pit)

Small Arms Firing Range, Site 8 (large targets and berm sample area)

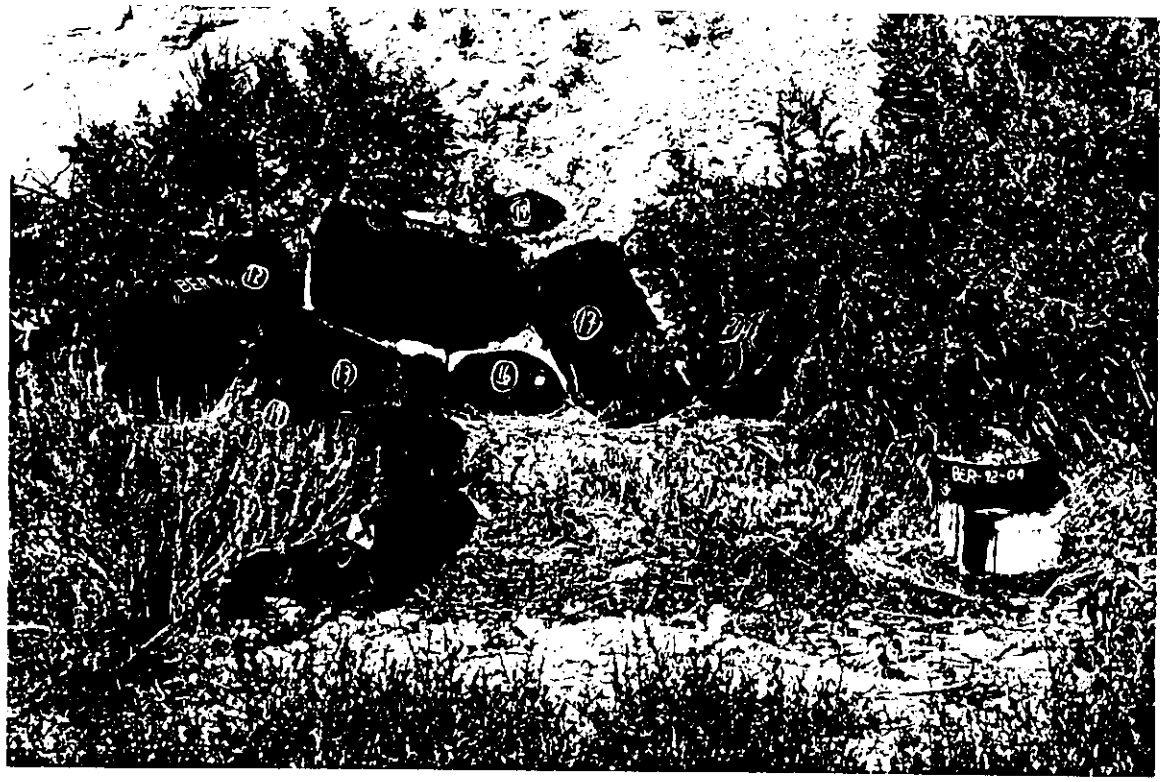
Small Arms Firing Range, Site 8 (firing stations and small berm sample area)

Box Elder Wash Drum Site, Site 41 (drum located downstream of main drum disposal site, bottom center of photograph)

Box Elder Wash Drum Site, Site 41 (surface tar spill area above wash)



Box Elder Wash Drum Site, Site 41 (general view of Box Elder Wash)



Box Elder Drum Site, Site 41 (area of barrels; note tar leaking from location BER 92-04)

APPENDIX E

PREVIOUS INVESTIGATION RESULTS

PREVIOUS INVESTIGATION RESULTS

ANALYTICAL RESULTS FOR FORMER TRANSFORMER STORAGE AREA AND PCB SPILL SITES

(from Engineering, Science, and Technology, Inc. (EA), 1988)

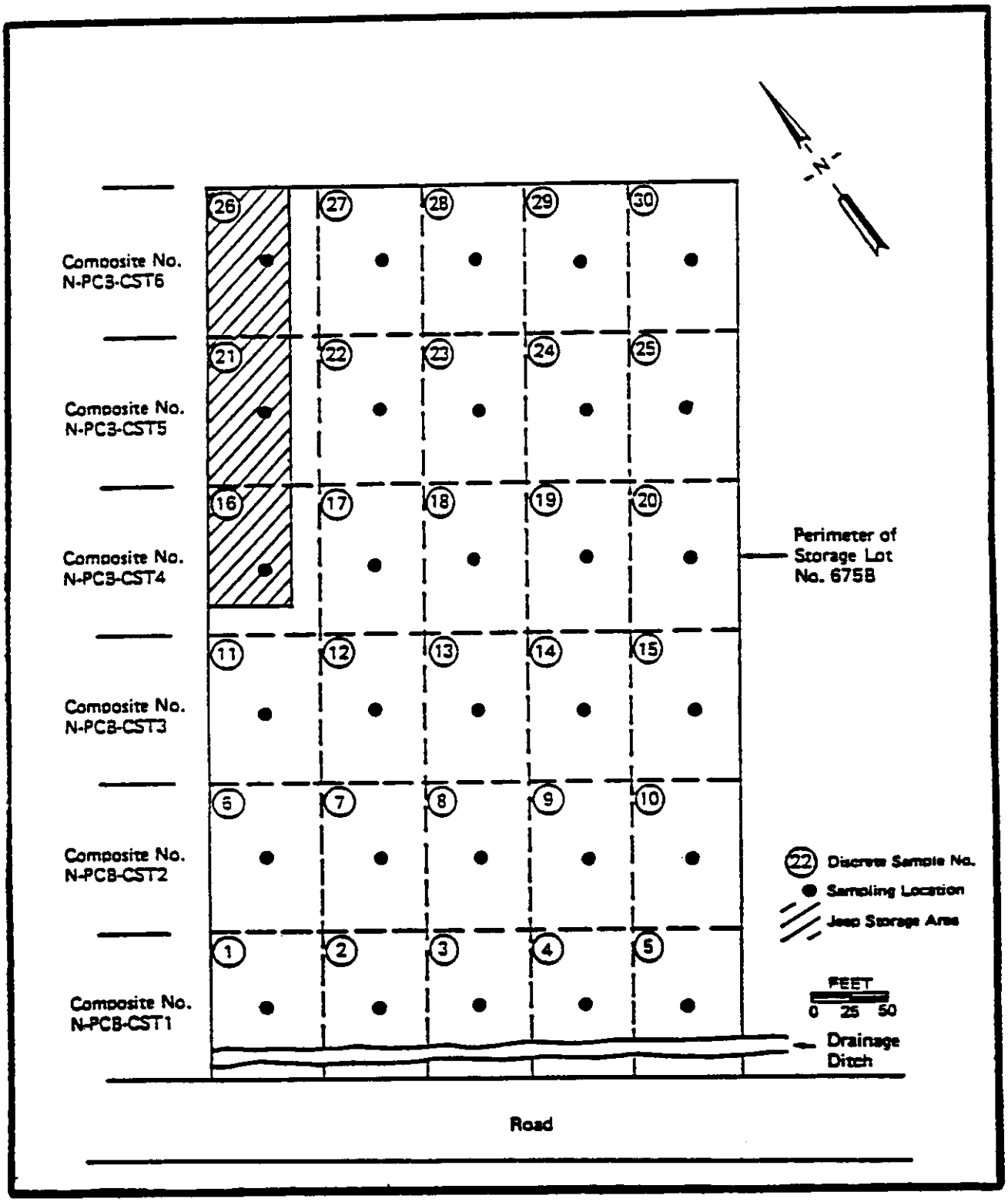


Figure 8-6. Sketch of N-TEAD Former Transformer Open Storage Lot No. 675B Showing Sampling Locations.

TABLE 7-5

C - Volatile Organics (Cont.)

Fluorotrichloromethane
Chlorodibromomethane
Tetrachloroethene
Toluene
Trichloroethene
Vinyl chloride
Total Xylenes

D - Inorganics

Chloride
Fluoride
Bromide
Phosphate
Sulfate
Gross alpha
Gross beta

E - Explosives

RDX
Nitrobenzene
1,3-Dinitrobenzene
1,3,5-Trinitrobenzene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2,4,6-Trinitrotoluene
HMX
Tetryl

G - Nitrogen

Nitrite
Nitrate

H - Pesticides

Aldrin
Alpha-BHC
Beta-BHC
Delta-BHC
Lindane
Chlordane
4,4'-DDD
4,4'-DDE
4,4'-DDT
Dieldrin
Endosulfan I
Encosulfan II
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Toxaphene

I - PCB's

PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260

L - Surfactants

(a) EPA Method 624 by GC/MS.
(b) EPA Method 625 by GC/MS.

NOTE: All above analyses were performed for all soil and water samples unless otherwise specified. If analyses were not listed on the summary tables provided in Chapter 8, all values were below the limits of detection.

TABLE 8-6 ANALYTICAL RESULTS FOR COMPOSITE SOIL SAMPLES COLLECTED AT THE FORMER TRANSFORMER OPEN STORAGE LOT NO. 675B, N-TEAD, 23 FEBRUARY 1987

Parameter (ug/g)	CST1	CST2	CST3	CST4	CTS5	CST6
Arclor 1016	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Arclor 1254	ND	ND	0.0191	ND	ND	ND
Arclor 1260	<0.07	<0.07	<0.07	<0.07	0.108	0.10
EA Sample Number	1329	1330	1331	1332	1333	1334

NOTE: ND indicates a compound not assigned a certified reporting limtit (CRL) and not found above the analytic detection limit.
CRLs are provided in Appendix I-G.
The parameters listed were determined according to methods not certified by USATHAMA.

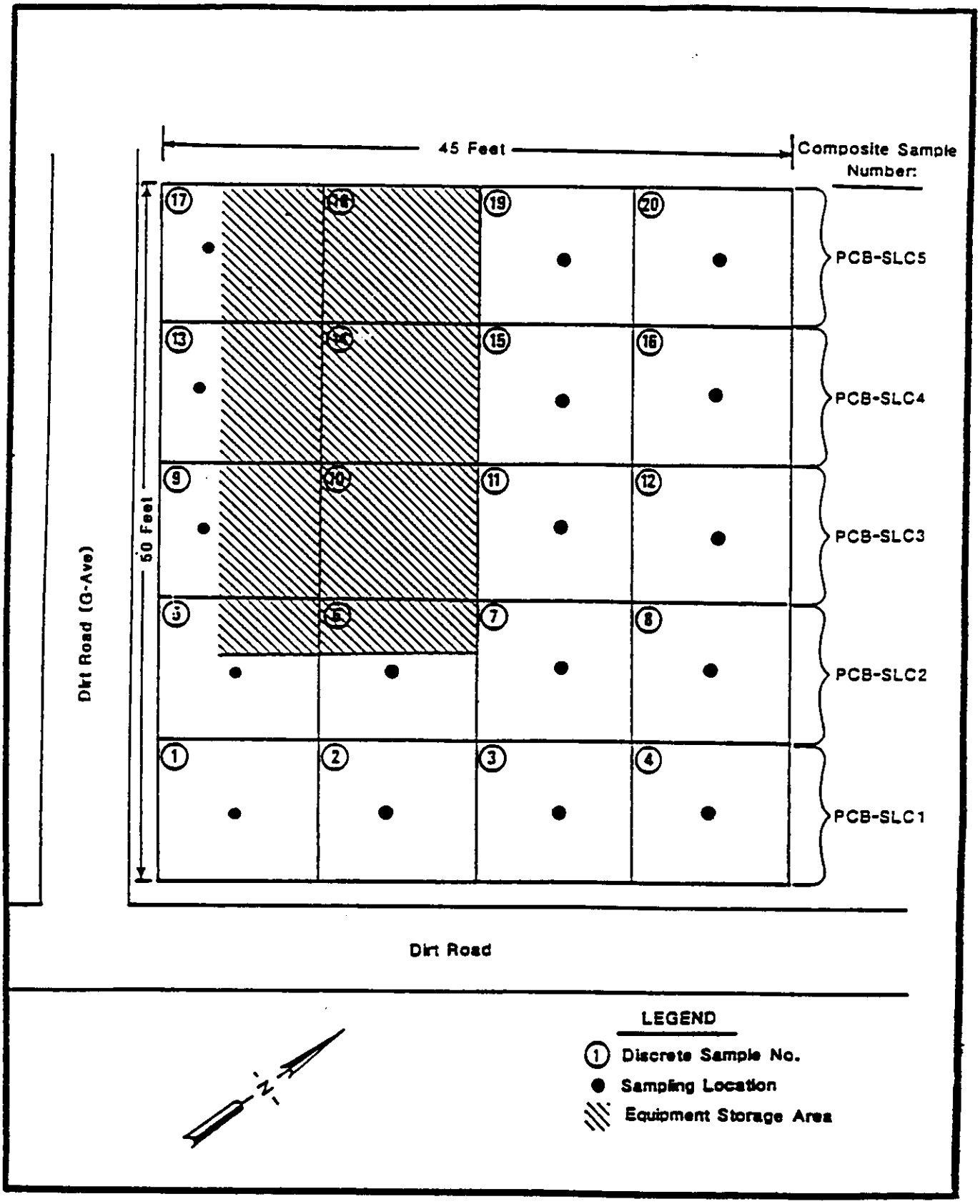


Figure 8-7. Sketch of PCB Spill Site, N-TEAD, Showing Sampling Locations.

TABLE 8-7 ANALYTICAL RESULTS FOR COMPOSITE SOIL SAMPLES COLLECTED AT THE PCB SPILL SITE, N-TEAD, 20 FEBRUARY 1987

Parameter (ug/g)	SLC1	SLC2	SLC3	SLC4	SLC5
Arclor 1016	<0.05	<0.05	<0.05	<0.05	<0.05
Arclor 1254	ND	ND	ND	ND	ND
Arclor 1260	0.0804	0.1150	0.2140	0.1740	0.0764
EA Sample Number	1272	1273	1274	1275	1276

NOTE: ND indicates a compound not assigned a certified reporting limit (CRL) and not found above the analytical detection limit.
CRLs are provided in Appendix I-G.
The parameters listed were determined according to methods not certified by USATHAMA.

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CSO ANALYTICAL RESULTS
SITE TYPE : COMP
SITE ID : PCB-ST
DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	02/23/87	ET	PCB016	99	2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0700	UGG	
			PCB254		2.0		.0191	UGG	
			PCB254		2.0	LT	.0990	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0		.1080	UGG	
			PCB260		2.0		.1000	UGG	
			PCB260		2.0	LT	.0700	UGG	
			PCB260		2.0	LT	.0700	UGG	

INSTALLATION RESTORATION PROGRAM
TOOELE AD (NORTH AREA)
CSO ANALYTICAL RESULTS
SITE TYPE : COMP
SITE ID : PCB-SL
DESCRIPTION :

SAMPLE PROG	SAMPLE DATE	LAB	NAME	METH NUMB	SAMPLE DEPTH(FT)	MEAS BOOL	CONCENTRATION	UNITS MEAS	INT STD
GQA	02/20/87	ET	PCB016	99	2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB016		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0700	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0710	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB254		2.0	LT	.0500	UGG	
			PCB260		2.0		.0804	UGG	
			PCB260		2.0		.1150	UGG	
			PCB260		2.0		.2140	UGG	
			PCB260		2.0		.1740	UGG	
			PCB260		2.0		.0764	UGG	

RADIOACTIVE WASTE STORAGE BUILDING (SITE 18)
EXAMPLE SURVEY RECORDS

RADIATION SAFETY SURVEY

DATE 15 Jan 1991

ORGANIZATION Radioactive Material Storage Area

LOCATION Building 659

TYPE OF SURVEY:
Initial ☐ Periodic ☐ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Controls and posted requirements are adequate.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination

No significant external radiation measurement.
Wipe tests for low energy Beta radiat- indicate contamination in waste storage area and location where radiography equipment had been stored.
See attached.

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
Beckman LS100C Liquid scintillation Counter		
Eberline 520 GM Survey Meter		

CONCLUSION/RECOMMENDATIONS:
Decontaminate areas when stock is shipped.

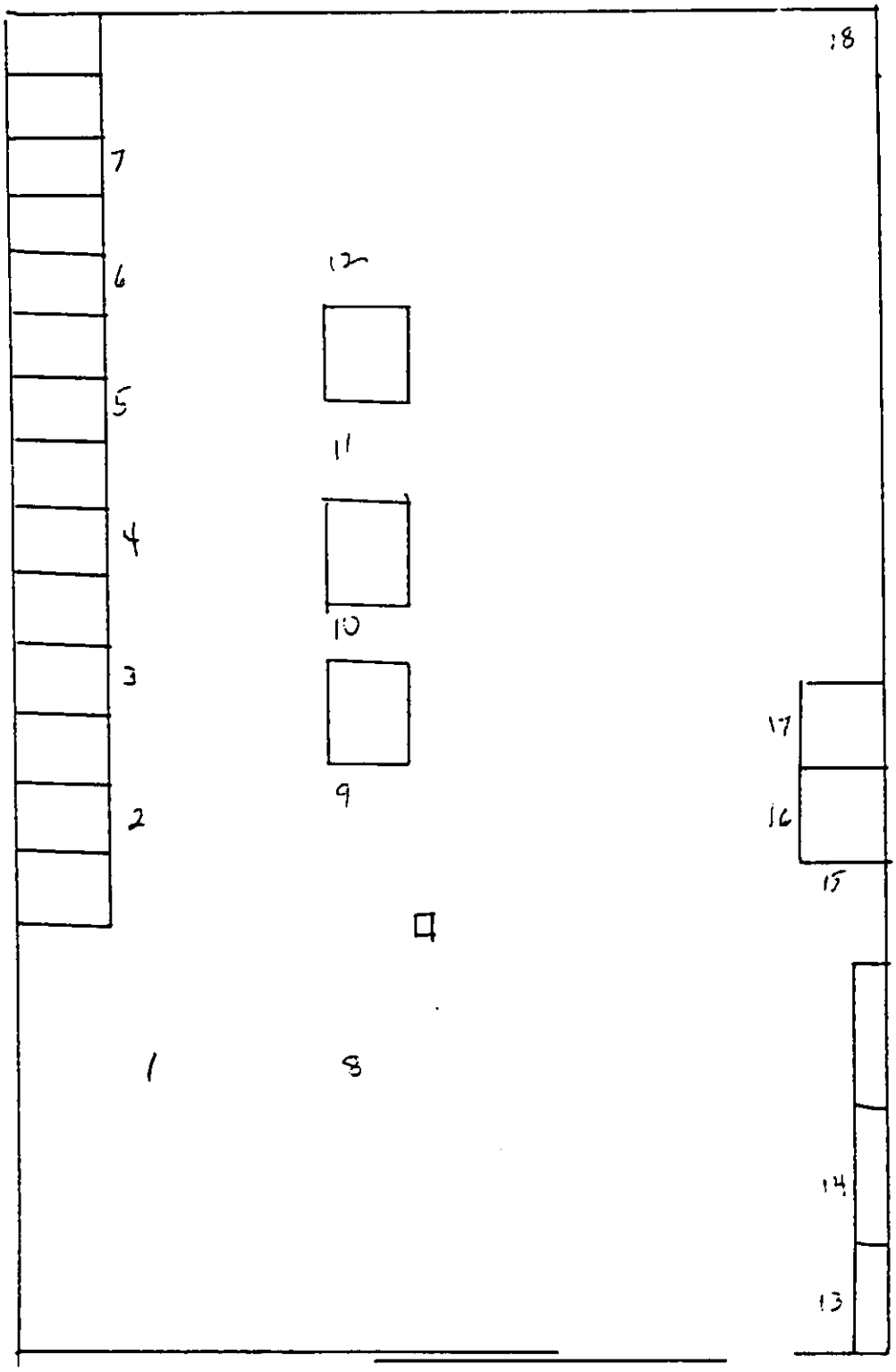
David N. Cr...
SURVEY OFFICER RPO

SDSTE Form 4086 30 Apr 87

LIQUID SCINTILLATION ANALYSIS

SAMPLE	CPM	BKGD	N CPM	EXT STD	EFF	DPM	REMARKS
1	30	31	0	238	040	0	
2	27	31	0	125	055	0	
3	29	31	0	227	087	0	
4	26	31	0	096	050	0	
5	24	31	0	001	025	0	
6	29	31	0	162	062	0	
7	28	31	0	139	058	0	
8	29	31	0	153	060	0	
9	29	31	0	278	105	0	
10	28	31	0	176	070	0	
11	29	31	0	110	050	0	
12	24	31	0	053	040	0	
13	32	31	0	005	27	0	
14	26	31	0	251	095	0	
15	31	31	0	248	085	0	
16	32	31	1	184	070	14	Not Significant
17	38	31	7	269	100	70	
18	32.	31	1	218	080	12	Not Significant

RADIOACTIVE MATERIALS STORAGE
BUILDING 659



RADIATION SAFETY SURVEY

DATE 10 Oct 1990

ORGANIZATION Supply Radioactive Storage

LOCATION Bldg 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Rad warning sign is posted. Entrance limited to those with TLD Badges. Many non radioactive items in storage but coded radioactive.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination
Attached.			

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
Eberline 520 GM Survey Meter		
Beckman LS 100C Liq Scint		
MMC PCY Gas Prop Counter		

CONCLUSION/RECOMMENDATIONS:
SCIC codes being challenged by Invmt Div. on non conforming storage. Contamination is acceptable.

David H Comm RPO
SURVEY OFFICER

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 04Dec91

ORGANIZATION Radioactive Storage

LOCATION Building 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS ALL RADIATION WARNING SIGNS ARE PRESENT. DOOR IS LOCKED WITH PADLOCK. THE KEY MUST BE CHECKED OUT FROM TOWER IN BLD 1831 TLD BADGES ARE LOCKED IN CABINET NEAR THE DOOR. NRC FORM 3 AND OTHER DOCUMENTS ARE POSTED.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination
SEE ATTACHED			

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
LUDLUM MODEL 3		
BECKMAN LS-1000 Liquid Scintillation		

CONCLUSION/RECOMMENDATIONS:

SURVEY OFFICER

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 10 July 1990

ORGANIZATION General Supply Division

LOCATION Radioactive Storage Bldg 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Signs are properly posted with SOP and required NRC Form 3 posted also. Storage is satisfactory.

RADIATION MEASUREMENTS:

Location (See ~~Reverse~~)	Radiation Type	Dose Rate	Contamination
Attached.			
	Gamma	Max 0.6	
	Beta	—	See attached.

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
NMC IPC-4	7458	—
Beckman LS100C		—

CONCLUSION/RECOMMENDATIONS:
Beta contamination was located on floor where thorium 232 components were removed. Will be decontaminated when compressors are removed.
Beta contamination was located on box pallets where tritium devices are stored - the person would will be difficult to decontaminate Level is not hazardous to personnel at this time.

Lewis W Chrisman
SURVEY OFFICER

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 4 Apr. 1990

ORGANIZATION Supply Radioactive Storage Area.

LOCATION Bldg 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Followup contamination survey was performed to confirm tritium contamination in the storage area. Radioactive waste is packed in preparation for disposal.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination
See Separate Sheet.			

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
Beckman LS100 Liq Scint. System		
XMC PC-4 Gas Proportional		

CONCLUSION/RECOMMENDATIONS:
Tritium contamination is confined in the area where the radioactive waste material was present. After shipment of the material, the contamination will be removed by scrubbing and cleaning out floors.

SURVEY OFFICER RPO

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 3 January 1990

ORGANIZATION General Supply Radioactive Materials Storage Area

LOCATION Bldg 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Radioactive material is contained in a locked room within the warehouse. Personnel must have a film badge prior to being issued the key to the area. A NRC Form 3, 5 x 8 and radiation warning sign is posted as required.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination
Attached.			

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
Beckman LS100 Liquid Scintillation Counter		
NMC PC-4 Gas Proportional Counter		

CONCLUSION/RECOMMENDATIONS:
H3 Contamination was located on the floor around the radioactive waste holding area. Follow-up will be accomplished to obtain disposition instructions on the waste material.

SURVEY OFFICER RSO

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 4 October 1989

ORGANIZATION Radioactive Storage Area.

LOCATION Building 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Radiation warning sign, NRC Form 3 and all other documents were properly posted at entrance to controlled storage area. Key to bldg and room are only available from Hazardous Material Br with proper identification. Controls to minimize radiation exposure are adequate.

RADIATION MEASUREMENTS:

Location (See Reverse)	Radiation Type	Dose Rate	Contamination
Attached.	Tritium.	—	up to 207 dpm -

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
Ludlum Model 3 w/4 Gamma Detector.		4 Oct 89
NMC PC-4 623 Proportional Counter		4 Oct 89
Beckman LS100C Liquid Scintillation System.		

CONCLUSION/RECOMMENDATIONS:
Contamination for a controlled area is acceptable.

[signature] RPO
SURVEY OFFICER

SDSTE Form 4086 30 Apr 87

RADIATION SAFETY SURVEY

DATE 10 July 1990

ORGANIZATION General Supply Division

LOCATION Radioactive Storage Bldg 659

TYPE OF SURVEY:
Initial ☐ Periodic ☒ Inventory ☐ Leak Test ☐ Contamination ☐
Termination ☐ Shipment ☐ Unplanned ☐ Special ☐

PHYSICAL OBSERVATIONS Signs are properly posted with SOP and required NRC Form 3 posted also. Storage is satisfactory.

RADIATION MEASUREMENTS:

Location (See ~~Reverse~~)	Radiation Type	Dose Rate	Contamination
Attached.			
	Gamma	max 0.6	
	Beta	—	See attached

RADIATION DETECTION AND ANALYSIS INSTRUMENTS:

Type	Serial Number	Calibration Date
NMC IPC-4	7458	—
Beckman LS100C		—

CONCLUSION/RECOMMENDATIONS:
Beta contamination was located on floor where thorium 232 components were removed. Will be decontaminated when components are removed.
Beta contamination was located on box pallets where thorium devices are stored - the pieces used will be difficult to decontaminate Level is not hazardous to personnel at this time.

Gene W Chrisman
SURVEY OFFICER

SDSTE Form 4086 30 Apr 87

PCB STORAGE BUILDING 659
STANDARD OPERATIONS PROCEDURES

DIRECTORATE OF SUPPLY
TOOELE ARMY DEPOT
TOOELE, UTAH 84074-5012

Standard Operating Procedure
Number 385-6

17 March 1992

HANDLING OF ITEMS CONTAINING POSSIBLE CONCENTRATIONS OF POLYCHLORINATED BIPHENYLS (PCB's) IN BUILDING 659

SECTION I

GENERAL

1-1 PURPOSE. To establish procedures to permit the safe storage and handling of items containing polychlorinated biphenyls (PCB's).

1-2 SCOPE. This procedure applies to all personnel who are involved in the handling, marking, storage, rewarehousing and inspection of items containing PCB's.

1-3 RESPONSIBILITIES.

a. Operations Division, Receiving and Storage Branch, Inside Storage Section personnel will be responsible for the handling, marking, storage, rewarehousing and inspection of items containing PCB's.

b. Accountability Division, Inventory Branch will be responsible for performing the inventory and location survey of the items in storage within building 659.

c. Supervisors will ensure that all new personnel have received the DoD Hazard Communication Training, and are briefed in the hazards relating to the handling of PCB items prior to commencing any work within the transformer storage facility, building 659.

1-4 REFERENCES.

a. Occupational Exposure to Polychlorinated Biphenyls (PCB's) DHEW (NIOSH) Publication #77-225.

This SOP Supersedes SOP 385-6 dated 8 May 1989 which should be destroyed.

b. TEAD Oil and Hazardous Substance Installation Spill Contingency Plan.

c. DoD Federal Hazard Communication Training Program (29 CFR 1910.1200).

SECTION II

ACTION

2-1 SAFETY PRECAUTIONS.

a. Personnel protective measures for handling of PCB contaminated or PCB items:

(1) Cotton gloves are adequate protection for handling of sealed units with no evidence of leakage.

(2) Neoprene rubber gloves, saranex disposable coveralls and neoprene boots will be required for handling units in which leakage has occured or when a spill is present. Personal Protective Equipment (PPE) shall be constructed of material impervious to PCB's.

(3) Chemical safety goggles or safety glasses w/side shields, and face shields (8 inch minimum) shall be worn during any operation with evidence of leakage, or spillage of PCB's or PCB contaminated oils.

(4) Coveralls will be provided to each person prior to commencing work. Coveralls and cotton gloves can be laundered and reused if they are free of any contamination. Contaminated clothing will be removed and placed in an appropriately marked container for proper disposal as a Toxic Substance Control Act (TSCA) regulated waste.

(5) A full face, air purifying respirator with organic vapor and high efficiency vapor (HEPA) stacked cartridges will be on hand and immediately available for use during PCB/PCB contaminated material cleanup operations.

b. Personnel safety precautions.

(1) Food, drink or smoking materials shall not be permitted in areas where PCB or PCB contaminated materials are handled, processed or stored.

(2) Employees exposed to PCB's shall wash their hands in soap and water prior to eating, smoking, drinking or using toilet facilities during each shift.

(3) Employees exposed to PCB or PCB contaminated material shall not wear work clothing away from the work site.

(4) A qualified and informed supervisor shall be present (mandatory) during all work operations involving leaking/spilled PCB or PCB contaminated material.

(5) A Material Safety Data Sheet (MSDS) for PCB's shall be present and immediately available for reference prior to work commencing on any PCB or PCB contaminated material leaks or spills.

c. Absorbent material (i.e., absorbent clay, vermiculite, or saw dust) will be kept on hand in the storage area.

2-2 MEDICAL SURVEILLANCE.

a. Initial medical exams are mandatory for all personnel occupationally exposed to PCB's.

b. Employees having medical conditions that could be directly or indirectly aggravated by exposure to PCB's shall be excluded from working on any PCB or PCB contaminated material leak or spill site.

c. Women in the work force who are of child bearing age shall be advised of the potential adverse effects of PCB's on unborn children.

d. Annual physical examinations are mandatory.

e. Medical records shall be maintained for personnel working with or exposed to PCB and PCB contaminated materials for the period of employment plus thirty years.

2-3 POSTING OF AREA.

a. Warning placards shall be affixed on all entrances of the North end of building 659, as well as inside the building in the immediate area of items containing PCB's or PCB contaminated materials.

b. The warning placard shall contain the following information:

POLYCHLORINATED BIPHENYLS
(PCB)
DANGER!
CANCER SUSPECT AGENT
AUTHORIZED PERSONNEL ONLY
Do not get in eyes, skin or clothing

First Aid: In case of skin contact, flush with running water. For eye contact, flush with large amounts of water for a minimum of 15 minutes. Immediately report to the Civilian Employees Health Clinic for evaluation and/or further treatment.

2-4 INFORMING PERSONNEL OF HAZARDS. All new personnel will complete the DoD Federal Hazard Communication Training Program, and be briefed on actual and potential hazards prior to commencing work on PCB or PCB contaminated materials.

2-5 PCB SPILL RESPONSE. During the routine handling of PCB and PCB contaminated material there is a potential for emergencies to occur. In the event of an emergency involving PCB's or PCB contaminated material, the procedures outlined in the TEAD Oil and Hazardous Substance Installation Spill Continguency Plan will be implemented. As a guide to the operator, the following procedures shall be implemented:

a. Cease all work.

b. Inform the site supervisor of the spill.

c. The site supervisor shall immediately contact the Fire Department, ext 911, if there is an immediate threat due to fire of injury. If there is no immediate threat, contact the Environmental Management Division, ext 3504, identifying the problem. Telephone notification shall also be immediately made to the Supply Environmental Program Coordinator, ext 2301, and the Receiving and Storage Branch Chief, ext 2417.

d. No work will resume until:

(1) The spill site is roped off and marked.

(2) The spill is contained, and absorbent material placed over the wet area, minimizing or eliminating the spread of any contamination.

(3) The Onscene Commander (Fire Department or Environmental Management Division representive) authorizes the spill cleanup to proceed; supervising the cleanup effort; and finally identifying that the spill incident/cleanup is terminated, all hazards to employees eliminated, and regular work activities can proceed.

2-6 HOUSE KEEPING. Regular house keeping duties shall be routinely performed in the storage area. These duties shall include, but not limited to policing of any litter, absorbion of any leakage from roof leaks, and routine sweep downs. All debris gathered inside the storage area as a result of policing actions, or sweep downs shall be placed in a container for proper disposal. The drum/s of debris shall receive a label compromible to items in the storage site (i.e. items in storage with a PCB contamination level of between 50 and 500 ppm, label the drum containing the debris as containing PCB contamination between 50 and 500 ppm). At not time will sweep down residue and debris be placed in a solid waste dumpster for disposal in the Depot landfill.

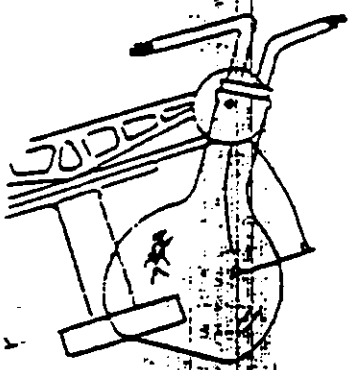
2-7 ACCESS AND KEY CONTROL.

a. An access list of individuals authorized to draw keys for the Transformer Storage Building (North end of 659)shall be maintained by the Chief, Inside Storage Section, building 630. Organizations desiring entry into the transformer storage facility will provide the Chief, Inside Storage Section with a list of personnel authorized to draw keys.

b. A daily roster of personnel entering the transformer storage building will be kept. This roster shall include the name of each person and their organization along with the times of entry and departure from the facility. All visitors to the building shall be escorted by an Inside Storage Section designated representive.

LARRY V. COX
LTC., OD.
Director of Supply

ANALYTICAL RESULTS FOR POLE TRANSFORMER PCB SPILL (SWMU 5)



Ford Chemical LABORATORY. INC.

Bacteriological and Chemical Analysis

40 WEST LOUISE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 466-8761

DATE : 11/89

CERTIFICATE OF ANALY

E ARMY DEPOT
ANAGMT OFFICE
40, BLDG. 7501
, UT 84074

SOIL SAMPLE SUBMITTED BY [illegible] AND CLARK FROM DRUMS AND G-2[illegible]
[illegible] SELECTED 10-31-89, [illegible] RECEIVED 10-31-89 FOR PCB
ANALYSIS STARTING AT [illegible] FOR P.O. [illegible]A-9226-0[illegible].

	RESULT
lorinated biphenyl ppm	3.45
olor Type	1,260

[illegible] CHEMIST FORD CHEMICAL LABORATORY, INC.

Composited from 11 drums
PCB transformer spill

GEOPHYSICAL SURVEY AND ANALYTICAL RESULTS FOR OLD BURN AREA

(from Roy F. Weston, 1989)

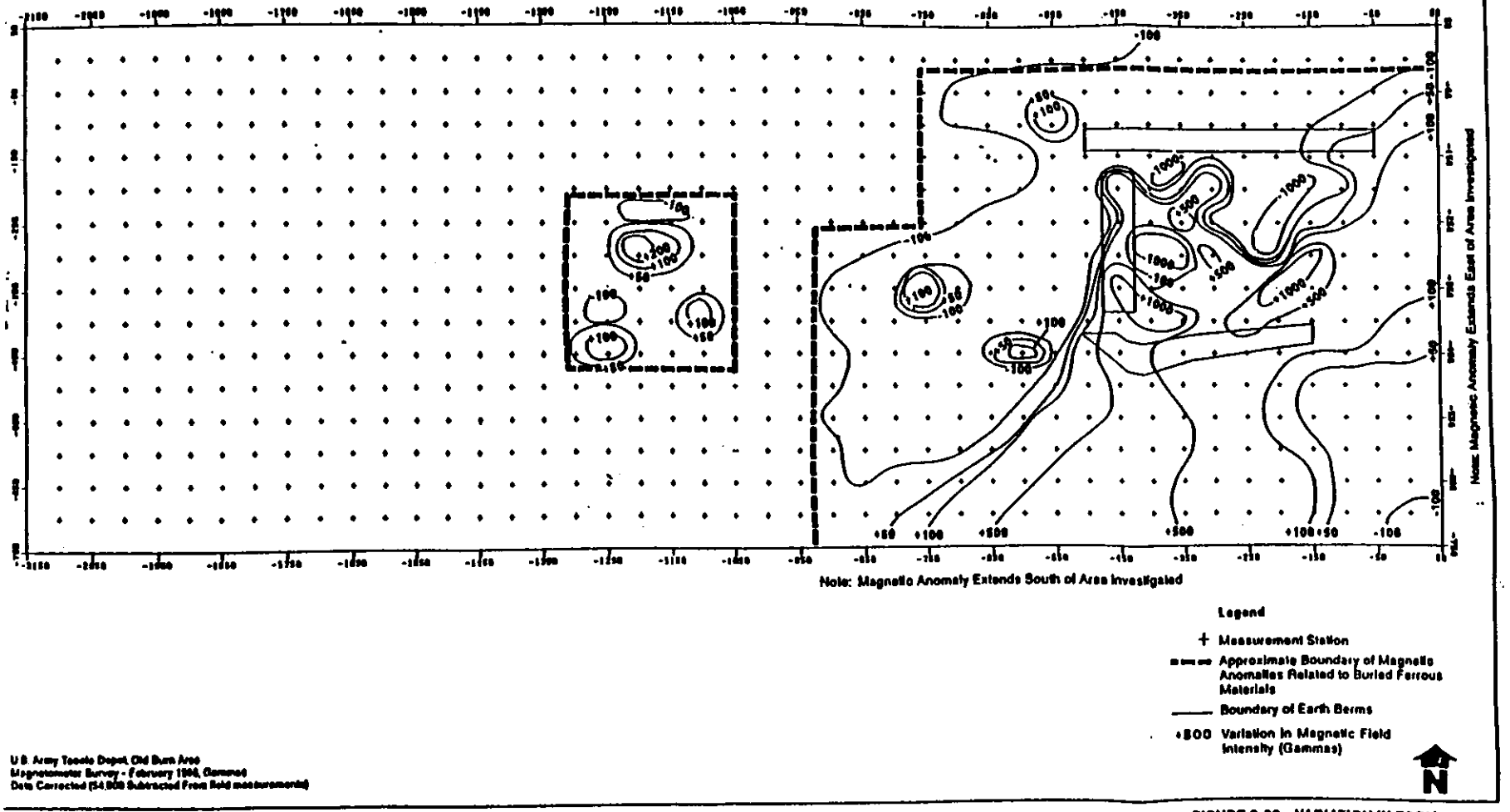
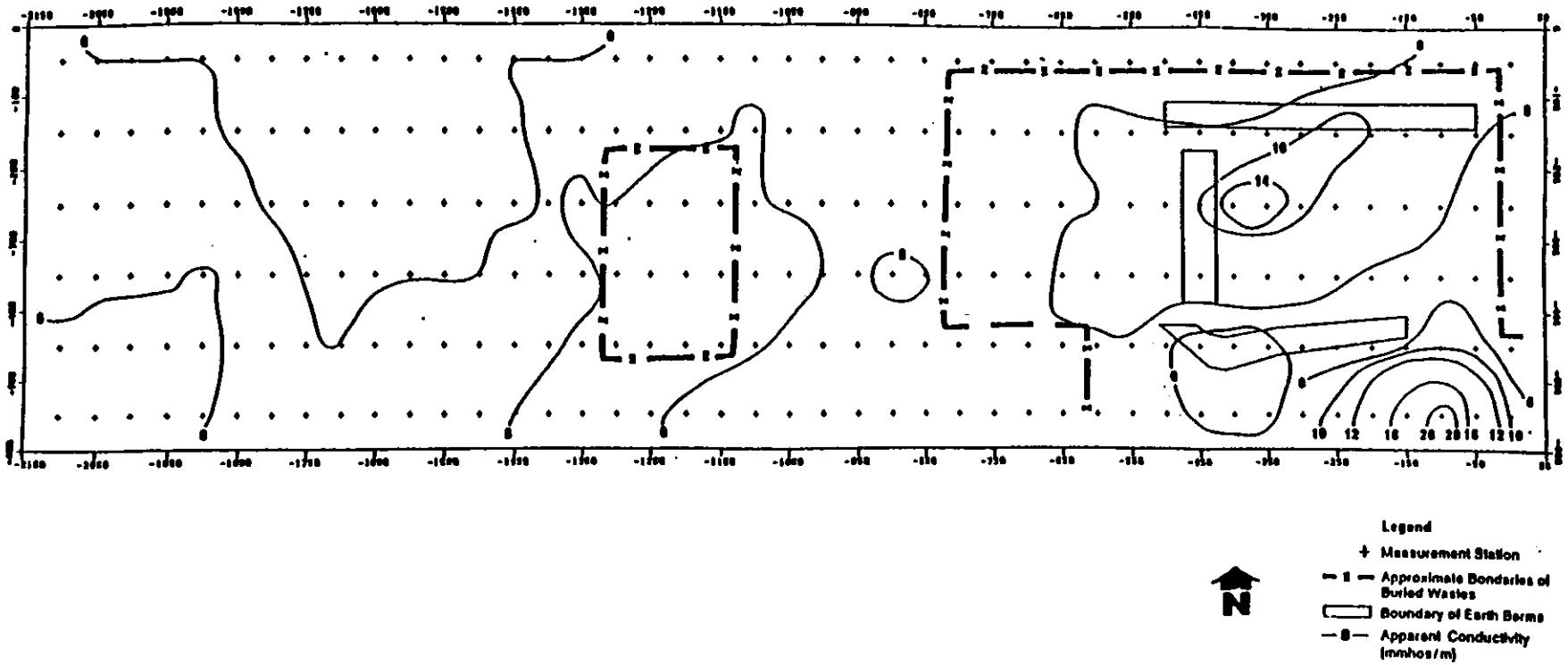
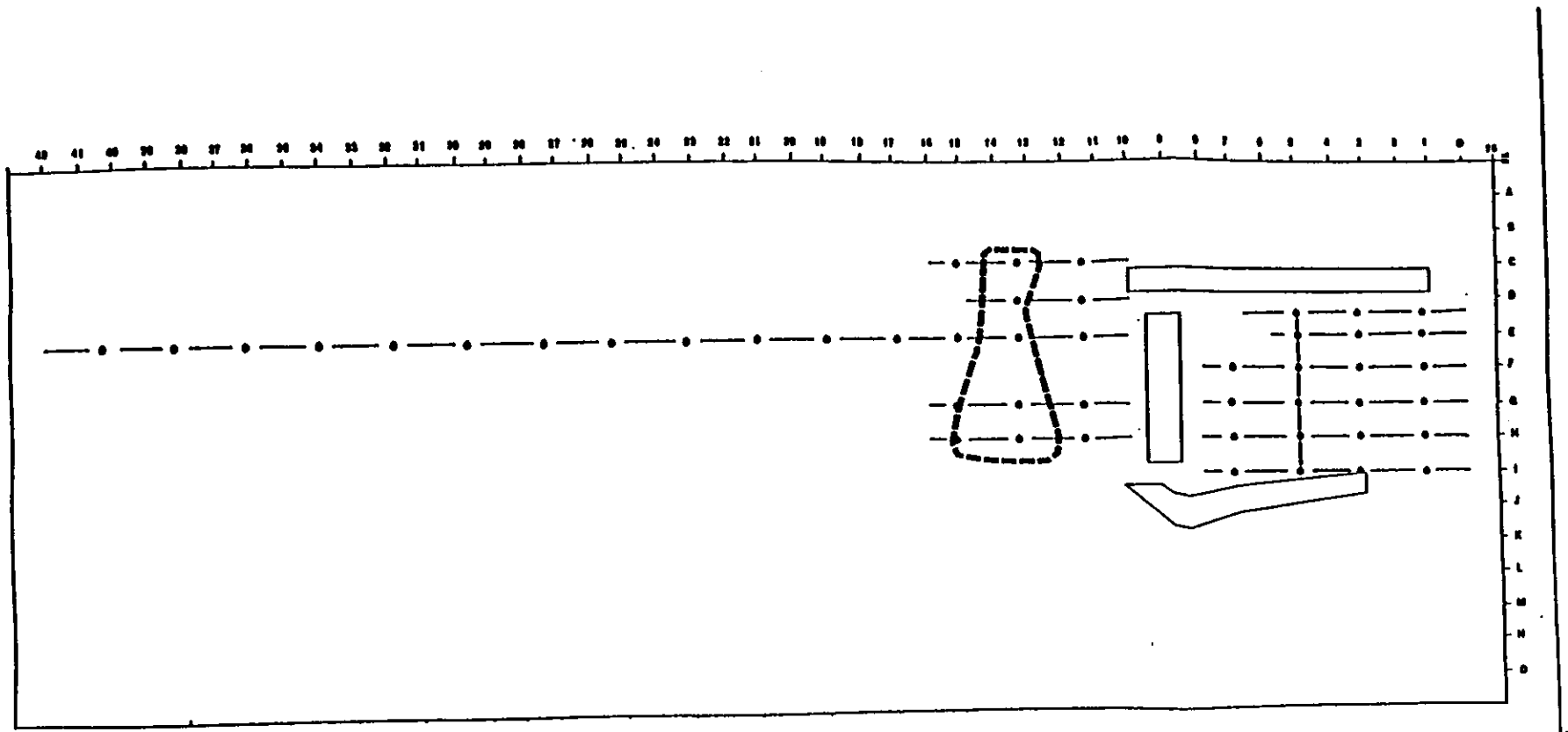


FIGURE 3-22 VARIATION IN TOTAL MAGNETIC FIELD, OLD BURN AREA



US Army Tooele Depot, Old Burn Area
Electromagnetic Survey - February 1986

FIGURE 3-23 VARIATION IN VERTICAL DIPOLE CONDUCTIVITY VALUES, OLD BURN AREA



Note: All GPR Lines run from east to west or west to east except for traverse from D5 to I5, which was run from north to south

N

Legend
- GPR traverses
- Boundary of Earth Berms
- Approximate Trench Boundaries

FIGURE 3-24 GPR TRAVERSE LOCATIONS, OLD BURN AREA

U.S. Army Tooele Depot, Old Burn Area
Ground Penetrating Radar Survey - February 1988

Table 4-14

Analyses of Borehole Samples From the Old Burn Area

Parameter	Borehole N-121-88								Borehole N-122-88							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	Concentrations in ug/g															
Depth (ft)	4.5	9.5	14.5	19.5	24.5	29.5	39.5	49.5	4.5	9.5	14.5	19.5	24.5	29.5	39.5	49.5
Explosives																
Metals																
Silver																
Arsenic	10.9		15.8	10.7												
Beryllium	0.47		1.03	0.79												0.337
Cadmium				1.06												
Chromium	45.9	5.43	(70)	(62)	6.87	5.96	7.47	10.6	11.5	(11)	13.6	(6)	10.1	9.64	8.35	15.1
Copper	33.8	6.5	41.7	(51)	4.75			6.57	6.93	10.1	8.3				6.72	8.36
Mercury																
Sodium	96.3	68.5	45.4	97.5	187	213	431	206	102	56.8	97.6	127	394	138	627	78.4
Nickel		7.52	6.52	5.25				10.1	14.9	(7.4)	15.6			5.7	8.06	12.7
Lead	10.6		12.9	15.4												
Antimony																
Selenium																
Thallium																
Zinc																69.2
Anions																
Bromide																
Chloride																
Fluoride	6.18	7.28														
Nitrate/Nitrite																
Sulfate																

Table 4-14

Analyses of Borehole Samples From the Old Burn Area
(continued)

Concentrations in ug/g

Parameter	Borehole N-123-88								Borehole N-124-88							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Depth (ft)	4.5	9.5	14.5	19.5	24.5	29.5	39.5	49.5	4.5	9.5	14.5	19.5	24.5	29.5	39.5	49.5
Explosives	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals																
Silver																
Arsenic								0.419								0.787
Beryllium										2.36						
Cadmium					6.03	4.33	6.45	13.5			5.1	5.22		7.97	8.31	53.6
Chromium					6.38		6.88	8.83					5.22	6.92	4.89	25.7
Copper																
Mercury	97	79.7	96.1	80	163	66.2	606	97.9	65.9	62.3	95.3	148	160	95.4	518	109
Sodium		8.18		44.5			10.5	13.5					7.03	23	6.81	64
Nickel				10.1												
Lead																
Antimony																
Selenium																
Thallium																
Zinc																69.2
Anions	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromide																
Chloride																
Fluoride																
Nitrate/Nitrite																
Sulfate																

ND = Parameters within this class of compounds were not detected.

Notes: Samples analyzed for all parameters indicated. A blank indicates that the parameter concentration was below the reporting limit.

Table 3-3

Summary of Geotechnical Laboratory Analysis of Selected Subsurface Soil Samples From the Old Burn Area, N-TEAD[a]

Sample Location	Depth Range (ft)	Uses Classification[b]	Visual Description[c]	Natural Moisture Content (%)	Specific Gravity[d]	Atterburg Limits[e] Liquid Limit (%)	Plastic Limit (%)	Plasticity Limit (%)
N-121-88	50.0-51.5	SM	Sand, silty	31.6	2.67	—	—	—
N-122-88	30.0-31.0	CL/ML	Gravel, sandy	31.06	2.65	28	22	6
N-122-88	39.5-40.5	SM	Sand, silty	13.6	2.68	—	—	—
N-122-88	40.0-41.5	SM	Sand, silty	27.0	2.65	—	—	—
N-122-88	45.0-46.5	CL	Sand, silty, clayey	35.2	[f]	50	24	26
N-123-88	39.5-40.5	SM	Sand, silty	9.2	2.65	—	—	—
N-123-88	49.5-50.5	CL/ML	Sand, clayey	24.4	2.65	30	23	7

[a]Laboratory analyses performed by Northern Engineering and Testing, Inc.
[b]Formula: NAUVAC DM-7.1 (1982).
[c]Visual description from borehole log.
[d]ASTM D854.
[e]ASTM D4318.
[f]Insufficient sample size prohibited performance of all tests requested.

GEOPHYSICAL SURVEY AND ANALYTICAL RESULTS FOR CHEMICAL RANGE

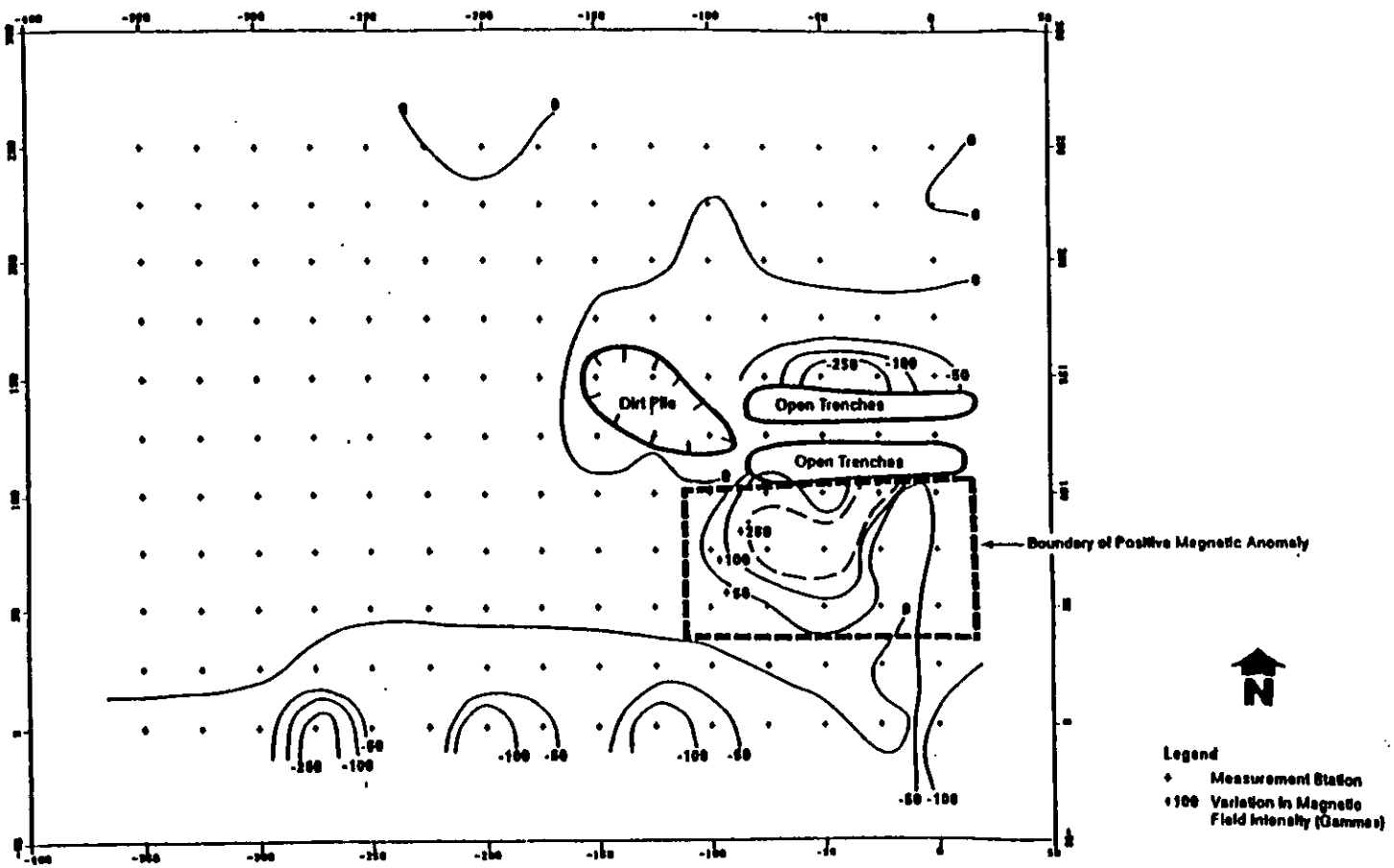
(from Roy F. Weston, 1989)

Table 4-15

Analyses of Soil Samples from the Chemical Range

Parameters	CR-88-01	CR-88-02	CR-88-03	CR-88-04	CR-88-05	CR-88-06	CR-88-07	CR-88-08	CR-88-09	CR-88-10	CR-88-11	CR-88-12
	Concentrations in ug/g											
Explosives												
Metals												
Silver												
Arsenic												
Beryllium	0.381	0.328	0.31	0.375	0.403	0.411		0.292	0.431	0.511	0.361	0.398
Cadmium	1.66						3.19				1.51	
Chromium	18.7	14.8	15.3	20	19.6	21.4	17.3	17.7	21.8	21.7	20.4	17.9
Copper	19.8	11.6	12.2	9.75	16.9	12.2	15.8	8.73	11.5	11.6	22.4	11.3
Mercury												
Sodium	119	13.2	50.2	213	149	144	108	117	117	112	116	131
Nickel	17.9			17.7	20	16.7	17.4	26.9	15.5	23.9	19.3	21.1
Lead	10.8	37.1	7.91	6.22	9.77	7.24	8.29		8.87	7.51	3.7	8.64
Antimony												
Selenium												
Thallium												
Zinc	384	2,000	137	118	111	77.2	752		70.5		886	125
Anions												
Bromide												
Chloride												
Fluoride							5.86	6.45	6.2			6.26
Nitrate/Nitrite												
Sulfate												

Notes: Samples analyzed for all parameters indicated. A blank indicates that the parameter concentration was less than the reporting limit. Sampling interval was 0.5 to 1 foot below soil surface.



U.S. Army Tooele Depot, Chemical Range Area
Magnetometer Survey - February 1988, Gammas
Data Corrected (54,000 Subtracted From All Z-Values)

FIGURE 3-28 VARIATION IN TOTAL MAGNETIC FIELD, CHEMICAL RANGE

ANALYTICAL RESULTS FOR BOX ELDER WASH DRUM SITE

(from TEAD EMO sampling in April 1989)

TABLE C-
ANALYTICAL RESULTS OF DRUM SAMPLES FROM BOX ELDER WASH DRUM SITE (SWMU-41)[1]
COLLECTED APRIL 1989

SITE INVESTIGATION WORK PLAN
TOOELE ARMY DEPOT, NORTH AREA

	SAMPLE[2,3]					
Inorganics (mg/ℓ[4])	1320-01	1320-02	1320-03	1320-04	1320-05	1320-06
Barium	0.05	0.031	NA	NA	NA	NA
Mercury	0.20	ND	NA	NA	NA	NA
Organics (mg/kg)[5]						
Benzene Acetic Acid	NA	NA	1J	ND	ND	ND
to C_{30} Aliphatic Hydrocarbons	NA	NA	43J	44J	ND	36J
thyl Phenanthrenes	NA	NA	1.2J	1.1J	ND	ND
methyl Phenanthrenes	NA	NA	1.7J	1.7J	ND	1.1J
$_5$ to C_{25} Polycyclic Aliphatic Hydrocarbons	NA	NA	31J	36J	ND	55J

NOTES:

[1] All results are reported as parts per million (ppm).
[2] Samples 01 and 02 were analyzed for inorganics; samples 03 through 06 were tested for organics.
[3] Sample numbers correspond to lab sample I.D. Numbers, as shown on the analytical lab reports.
[4] The inorganic analysis was for the characteristic of EP Toxicity. Values are reported as mg/ℓ (or ppm).
[5] The organic compounds are reported as mg/kg (or ppm).
NA = Not analyzed.
ND = Not detected above analytical detection limits.
J = Indicates a tentative value.

BOX ELDER WASH DRUM SITE (SWMU-41)
SAMPLE 1320-01; EP TOX METALS;
CONTRACT #: DAAC8989A0194;
DELIVERY ORDER: 9052-0168;
DATE: April 27, 1989

REPORT OF FINDING

TOOELE SAMPLE NUMBER: T-043

LABORATORY SAMPLE NUMBER: 1320-01

SAMPLE DESCRIPTION: Drums "J" Block

PARAMETER	METHOD USED	DETECTION LIMIT mg/L	RESULTS mg/L
EP TOXICITY-METALS	1310		
Arsenic	7060	0.05	ND
Barium	6010	0.01	0.05
Cadmium	6010	0.05	ND
Chromium	6010	0.05	ND
Lead	6010	0.05	ND
Mercury	7471	0.01	0.20
Selenium	7740	0.1	ND
Silver	6010	0.05	ND

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

BOX ELDER WASH DRUM SITE (SWMU-41)
SAMPLE 1320-01; EP TOX METALS;
CONTRACT #: DAAC8989A0194;
DELIVERY ORDER: 9052-0168;
DATE: April 27, 1989

REPORT OF FINDING

TOOELE SAMPLE NUMBER: T-044

LABORATORY SAMPLE NUMBER: 1320-02

SAMPLE DESCRIPTION: Drums "J" Block

PARAMETER	METHOD USED	DETECTION LIMIT mg/L	RESULTS mg/L
EP TOXICITY-METALS	1310		
Arsenic	7060	0.05	ND
Barium	6010	0.01	0.031
Cadmium	6010	0.05	ND
Chromium	6010	0.05	ND
Lead	6010	0.05	ND
Mercury	7471	0.01	ND
Selenium	7740	0.1	ND
Silver	6010	0.05	ND

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot CONTACT: Lyman Thorpe
DATE RECEIVED: April 19, 1989 RECEIVED BY: Arlene McGill
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260 Purge & Trap GC/MS	April 22, 1989
Eao I.D. Number:	Field Sample I.D. Number:	
1320-03	Drums "J" Block T063	

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
Acetone	1,000.	< 1,000.
Acrolein	1,000.	< 1,000.
Acrylonitrile	1,000.	< 1,000.
Benzene	200.	< 200.
Bromobenzene	200.	< 200.
Bromochloromethane	200.	< 200.
Bromodichloromethane	200.	< 200.
Bromoform	200.	< 200.
Bromomethane	500.	< 500.
2-Butanone	1,000.	< 1,000.
n-Butylbezene	200.	< 200.
sec-Butylbenzene	200.	< 200.
tert-Butylbenzene	200.	< 200.
Carbon disulfide	200.	< 200.
Carbon tetrachloride	200.	< 200.
Chlorobenzene	200.	< 200.
Chloroethane	500.	< 500.
2-Chloroethyl vinyl ether	1,000.	< 1,000.
Chloroform	200.	< 200.
bis-2-Chloroisopropyl ether	500.	< 500.
Chloromethane	500.	< 500.
2-Chlorotoluene	200.	< 200.
4-Chlorotoluene	200.	< 200.
Dibromochloromethane	200.	< 200.
1,2-Dibromo-3-chloropropane	200.	< 200.

LAB SAMPLE I.D. NUMBER: 1320-03

FIELD SAMPLE I.D. NUMBER: Drums "J" Block T063

ANALYTICAL RESULTS:

Units = ug/kg(ppb)

VOLATILE ORGANIC ANALYTES

ANALYTE	DETECTION LIMIT	RESULTS
Tichloroethene	200.	< 200.
Trichlorofluoromethane	200.	< 200.
1,2,3-Trichloropropane	200.	< 200.
1,1,2-Trichlorotrifluoroethane	200.	< 200.
1,2,4-Trimethylbenzene	200.	< 200.
1,3,5-Trimethylbenzene	200.	< 200.
Vinyl acetate	500.	< 500.
Vinyl chloride	500.	< 500.
o-Xylene	200.	< 200.
m-Xylene	200.	< 200.
p-Xylene	200.	< 200.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
SET DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Semi Volatile Aromatics	EPA SW-846 #8270	April 26, 1989

Lab Sample I.D. Number:	Field Sample I.D. Number:
1320-03	Drums "J" Block T063

ANALYTICAL RESULTS:
Units = ug/kg (ppb)

ACID COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Benzoicacid	2,500.	< 2,500.
Benzylalcohol	1,000.	< 1,000.
2-Chlorophenol	1,000.	< 1,000.
2,4-Dichlorophenol	1,000.	< 1,000.
2,4-Dimethylphenol	1,000.	< 1,000.
4,6-Dinitrophenol	2,500.	< 2,500.
2,4-Dinitrophenol	2,500.	< 2,500.
2-Methylphenol	1,000.	< 1,000.
4-Methylphenol	1,000.	< 1,000.
2-Nitrophenol	2,500.	< 2,500.
4-Nitrophenol	2,500.	< 2,500.
4-Chloro-3-methylphenol	1,000.	< 1,000.
Pentachlorophenol	2,500.	< 2,500.
Phenol	1,000.	< 1,000.
2,4,6-Trichlorophenol	1,000.	< 1,000.
2,4,5-Trichlorophenol	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-03

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T063

ANALYTICAL RESULTS
Units = ug/kg (ppb)

BASE/NEUTRAL COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
1,2 Diphenylhydrazine	1,000.	< 1,000.
Fluoranthene	1,000.	< 1,000.
Fluorene	1,000.	< 1,000.
Hexachlorobenzene	1,000.	< 1,000.
Hexachlorobutadiene	1,000.	< 1,000.
Hexachlorocyclopentadiene	1,000.	< 1,000.
Hexachloroethane	1,000.	< 1,000.
Indene	1,000.	< 1,000.
Indeno (1,2,3-cd) pyrene	2,500.	< 2,500.
Isophorone	1,000.	< 1,000.
1-Methylnaphthalene	1,000.	< 1,000.
2-Methylnaphthalene	1,000.	< 1,000.
2-Methyl chrysene	1,000.	< 1,000.
Naphthalene	1,000.	< 1,000.
2-Nitroaniline	1,000.	< 1,000.
3-Nitroaniline	1,000.	< 1,000.
4-Nitroaniline	1,000.	< 1,000.
Nitrobenzene	1,000.	< 1,000.
N-Nitrosodimethylamine	1,000.	< 1,000.
N-Nitrosodi-n-propylamine	1,000.	< 1,000.
N-Nitrosodiphenylamine	1,000.	< 1,000.
Phenanthrene	1,000.	< 1,000. J
Pyrene	1,000.	< 1,000. J
Quinoline	1,000.	< 1,000.
1,2,4-Trichlorobenzene	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-03

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T063

ANALYTICAL RESULTS

TENTATIVELY IDENTIFIED COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Benzene Acetic Acid	1,000	1,000. J
C_8 to C_{30} Aliphatic Hydrocarbons	1,000.	43,000. J
Methyl Phenanthrenes	1,000.	1,200. J
Dimethyl Phenanthrenes	1,000.	1,700. J
C_{15} to C_{25} Polycyclic Aliphatic Hydrocarbons	1,000.	31,000. J

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
CONTACT: Lyman Thorpe
DATE RECEIVED: April 19, 1989
RECEIVED BY: Arlene McGill
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260 Purge & Trap GC/MS	April 22, 1989

Lab Sample I.D. Number:	Field Sample I.D. Number:
1320-04	Drums "J" Block T064

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
Acetone	1,000.	< 1,000.
Acrolein	1,000.	< 1,000.
Acrylonitrile	1,000.	< 1,000.
Benzene	200.	< 200.
Bromobenzene	200.	< 200.
Bromochloromethane	200.	< 200.
Bromodichloromethane	200.	< 200.
Bromoform	200.	< 200.
Bromomethane	500.	< 500.
2-Butanone	1,000.	< 1,000.
n-Butylbenzene	200.	< 200.
sec-Butylbenzene	200.	< 200.
tert-Butylbenzene	200.	< 200.
Carbon disulfide	200.	< 200.
Carbon tetrachloride	200.	< 200.
Chlorobenzene	200.	< 200.
Chloroethane	500.	< 500.
2-Chloroethyl vinyl ether	1,000.	< 1,000.
Chloroform	200.	< 200.
cis-2-Chloroisopropyl ether	500.	< 500.
Chloromethane	500.	< 500.
2-Chlorotoluene	200.	< 200.
4-Chlorotoluene	200.	< 200.
Dibromochloromethane	200.	< 200.
1,2 -Dibromo-3-chloropropane	200.	< 200.

LAB SAMPLE I.D. NUMBER:
1320-4

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T064

ANALYTICAL RESULTS:

Units = ug/kg/(ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
1,2-Dibromoethane	200.	< 200.
Dibromomethane	200.	< 200.
1,2-Dichlorobenzene	200.	< 200.
1,3-Dichlorobenzene	200.	< 200.
1,4-Dichlorobenzene	200.	< 200.
Dichlorodifluoromethane	200.	< 200.
1,1-Dichloroethane	200.	< 200.
1,2-Dichloroethane	200.	< 200.
1,1-Dichloroethene	200.	< 200.
cis-1,2-Dichloroethene	200.	< 200.
trans-1,2-Dichloroethene	200.	< 200.
1,2-Dichloropropane	200.	< 200.
1,3-Dichloropropane	200.	< 200.
2,2-Dichloropropane	200.	< 200.
1,1-Dichloropropene	200.	< 200.
Ethyl acetate	500.	< 500.
Ethyl ether	500.	< 500.
Ethylbenzene	200.	< 200.
Hexachlorobutadiene	200.	< 200.
2-Hexanone	500.	< 500.
Isopropylbenzene	200.	< 200.
p-Isopropyltoluene	200.	< 200.
Methylene chloride	200.	< 200.
4-Methyl-2-pentanone	500.	< 500.
Naphthalene	200.	< 200.
n-Propylbenzene	200.	< 200.
Styrene	200.	< 200.
1,1,1,2-Tetrachloroethane	200.	< 200.
1,1,2,2-Tetrachloroethane	200.	< 200.
Tetrachloroethene	200.	< 200.

Units = ug/kg/(ppb) **VOLATILE ORGANIC ANALYTES** (continued)

ANALYTE	DETECTION LIMIT	RESULTS
Toluene	200.	< 200.
1,2,3-Trichlorobenzene	200.	< 200.
1,2,4-Trichlorobenzene	200.	< 200.
1,1,1-Trichloroethane	200.	< 200.
1,1,2-Trichloroethane	200.	< 200.
Trichloroethene	200.	< 200.
Trichlorofluoromethane	200.	< 200.
1,2,3-Trichloropropane	200.	< 200.
1,1,2-Trichlorotrifluoroethane	200.	< 200.
1,2,4-Trimethylbenzene	200.	< 200.
1,3,5-Trimethylbenzene	200.	< 200.
Vinyl acetate	500.	< 500.
Viny chloride	500.	< 500.
o-Xylene	200.	< 200.
m-Xylene	200.	< 200.
p-Xylene	200.	< 200.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
CONTACT: Lyman Thorpe
DATE RECEIVED: April 19, 1989
RECEIVED BY: Arlene McGill
SET IDENTIFICATION NUMBER: 1320
SET DESCRIPTION: Four-Tar-Like Solids

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Semi Volatile Aromatics	EPA SW-846 #8270	April 22, 1989

Lab Sample I.D. Number:	Field Sample I.D. Number:
1320-04	Drums "J" Block T064

ANALYTICAL RESULTS:

Units = ug/kg (ppb)

ACID COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Benzoic acid	2,500.	< 2,500.
Benzylalcohol	1,000.	< 1,000.
2-Chorophenol	1,000.	< 1,000.
2,4-Dichlorophenol	1,000.	< 1,000.
2,4-Dimethylphenol	1,000.	< 1,000.
4,6-Dinitrophenol	2,500.	< 2,500.
2,4-Dinitrophenol	2,500.	< 2,500.
2-Methylphenol	1,000.	< 1,000.
4-Methylphenol	1,000.	< 1,000.
2-Nitrophenol	2,500.	< 2,500.
4-Nitrophenol	2,500.	< 2,500.
4-Chloro-3-methylphenol	1,000.	< 1,000.
Pentachlorophenol	2,500.	< 2,500.
Phenol	1,000.	< 1,000.
2,4,6-trichlorophenol	1,000.	< 1,000.
2,4,5-trichlorophenol	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER: 1320-04

FIELD SAMPLE I.D. NUMBER: Drums "J" Block T064

ANALYTICAL RESULTS:

Units = ug/kg/(ppb) **BASE/NEUTRAL COMPOUNDS**

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Acenaphthene	1,000.	< 1,000.
Acenaphthylene	1,000.	< 1,000.
Aniline	1,000.	< 1,000.
Anthracene	1,000.	< 1,000.
Benzenethiol	1,000.	< 1,000.
Benzidine	5,000.	< 5,000.
Benzo(a)anthracene	1,000.	< 1,000.
Benzo(a)pyrene	1,000.	< 1,000.
3,4-Benzo(b)fluoranthene	1,000.	< 1,000.
Benzo(g,h,i)perylene	2,500.	< 2,500.
Benzo(k)fluoranthene	1,000.	< 1,000.
bis(2-Chloroethoxy)methane	1,000.	< 1,000.
bis(2-Chloroethyl)ether	1,000.	< 1,000.
bis(2-Chloroisopropyl)ether	1,000.	< 1,000.
bis(2-Ethylhexy)phthalate	1,000.	< 1,000.
4-Bromophenyl phenyl ether	1,000.	< 1,000.
4-Chloroaniline	1,000.	< 1,000.
Butylbenzyl phthalate	1,000.	< 1,000.
2-Chloronaphthalene	1,000.	< 1,000.
4-Chlorophenyl phenyl ether	1,000.	< 1,000.
Chrysene	1,000.	< 1,000.
Dibenz(a,h)acridine	2,500.	< 2,500.
Dibenz(a,h)anthracene	2,500.	< 2,500.
Dibenzofuran	1,000.	< 1,000.
1,2-Dichlorobenzene	1,000.	< 1,000.
1,3-Dichlorobenzene	1,000.	< 1,000.
1,4-Dichlorobenzene	1,000.	< 1,000.
3,3-Dichlorobenzidine	1,000.	< 1,000.
Diethylphthalate	1,000.	< 1,000.
1,2-Dimethylbenz(a)anthracene	1,000.	< 1,000.
Dimethylphthalate	1,000.	< 1,000.
Di-n-butyl phthalate	1,000.	< 1,000.
2,4-Dinitrotoluene	1,000.	< 1,000.
2,6-Dinitrotoluene	1,000.	< 1,000.
Di-n-octyl phthalate	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-04

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T064

ANALYTICAL RESULTS:

Units = ug/kg/(ppb) **BASE/NEUTRAL COMPOUNDS**

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
1,2-Diphenylhydrazine	1,000.	< 1,000.
Fluoranthene	1,000.	< 1,000.
Fluorene	1,000.	< 1,000.
Hexachlorobenzene	1,000.	< 1,000.
Hexachlorobutadiene	1,000.	< 1,000.
Hexachlorocyclopentadiene	1,000.	< 1,000.
Hexachloroethane	1,000.	< 1,000.
Indene	1,000.	< 1,000.
Indeno(1,2,3-cd)pyrene	2,500.	< 2,500.
Isophorone	1,000.	< 1,000.
1-Methylnaphthalene	1,000.	< 1,000.
2-Methylnaphthalene	1,000.	< 1,000.
Methylchrysene	1,000.	< 1,000.
Naphthalene	1,000.	< 1,000.
2-Nitroaniline	1,000.	< 1,000.
3-Nitroaniline	1,000.	< 1,000.
4-Nitroaniline	1,000.	< 1,000.
Nitrobenzene	1,000.	< 1,000.
N-Nitrosodimethylamine	1,000.	< 1,000.
N-Nitrosodi-n-propylamine	1,000.	< 1,000.
N-Nitrosodiphenylamine	1,000.	< 1,000.
Phenanthrene	1,000.	< 1,000. J
Pyrene	1,000.	< 1,000. J
Quinoline	1,000.	< 1,000.
1,2,4-Trichlorobenzene	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-04

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T064

ANALYTICAL RESULTS:

TENTATIVELY IDENTIFIED COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
C_8 to C_{30} Aliphatic Hydrocarbons	1,000.	44,000. J
Methyl Phenanthrenes	1,000.	1,100. J
Dimethyl Phenanthrenes	1,000.	1,700. J
C_{15} to C_{25} Polycyclic Aliphatic Hydrocarbons	1,000.	36,000. J

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
CONTACT: Lyman Thorpe
DATE RECEIVED: April 19, 1989
RECEIVED BY: Arlene McGill
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260 Purge & Trap GC/MS	April 22, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-05	Drums "J" Block T065

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
Acetone	1,000.	< 1,000.
Acrolein	1,000.	< 1,000.
Acrylonitrile	1,000.	< 1,000.
Benzene	200.	< 200.
Bromobenzene	200.	< 200.
Bromochloromethane	200.	< 200.
Bromodichloromethane	200.	< 200.
Bromoform	200.	< 200.
Bromomethane	500.	< 500.
2-Butanone	1,000.	< 1,000.
n-Butylbenzene	200.	< 200.
sec-Butylbenzene	200.	< 200.
tert-Butylbenzene	200.	< 200.
Carbon disulfide	200.	< 200.
Carbon tetrachloride	200.	< 200.
Chlorobenzene	200.	< 200.
Chloroethane	500.	< 500.
2-Chloroethyl vinyl ether	1,000.	< 1,000.
Chloroform	200.	< 200.
bis-2-Chloroisopropyl ether	500.	< 500.
Chloromethane	500.	< 500.
2-Chlorotoluene	200.	< 200.
4-Chlorotoluene	200.	< 200.
Dibromochloromethane	200.	< 200.
1,2-Dibromo-3-chloropropane	200.	< 200.

LAB SAMPLE I.D. NUMBER:
1320-05

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T065

ANALYTICAL RESULTS:
Units = ug/kg (ppb)

VOLATILE ORGANIC ANALYTES

ANALYTE	DETECTION LIMIT	RESULTS
1,2-Dibromoethane	200.	< 200.
Dibromomethane	200.	< 200.
1,2-Dichlorobenzene	200.	< 200.
1,3-Dichlorobenzene	200.	< 200.
1,4-Dichlorobenzene	200.	< 200.
Dichlorodifluoromethane	200.	< 200.
1,1-Dichloroethane	200.	< 200.
1,2-Dichloroethane	200.	< 200.
1,1-Dichloroethene	200.	< 200.
cis-1,2-Dichloroethene	200.	< 200.
trans-1,2-Dichloroethene	200.	< 200.
1,2-Dichloropropane	200.	< 200.
1,3-Dichloropropane	200.	< 200.
2,2-Dichloropropane	200.	< 200.
1,1-Dichloropropene	200.	< 200.
Ethylacetate	500.	< 500.
Ethyl ether	500.	< 500.
Ethylbenzene	200.	< 200.
Hexachlorobutadiene	200.	< 200.
2-Hexanone	500.	< 500.
Isopropylbenzene	200.	< 200.
p-Isopropyltoluene	200.	< 200.
Methylene chloride	200.	< 200.
4-Methyl-2-pentanone	500.	< 500.
Naphthalene	200.	< 200.
n-Propylbenzene	200.	< 200.
Styrene	200.	< 200.
1,1,1,2-Tetrachloroethane	200.	< 200.
1,1,2,2-Tetrachloroethane	200.	< 200.
Tetrachloroethene	200.	< 200.

VOLATILE ORGANIC ANALYTES (continued)

ANALYTE	DETECTION LIMIT	RESULTS
Toluene	200.	< 200.
1,2,3-Trichlorobenzene	200.	< 200.
1,2,4-Trichlorobenzene	200.	< 200.
1,1,1-Trichloroethane	200.	< 200.
1,1,2-Trichloroethane	200.	< 200.
Trichloroethene	200.	< 200.
Trichlorofluoromethane	200.	< 200.
1,2,3-Trichloropropane	200.	< 200.
1,1,2-Trichlorotrifluoro ethane	200.	< 200.
1,2,4-Trimethylbenzene	200.	< 200.
1,3,5-Trimethylbenzene	200.	< 200.
Vinyl acetate	500.	< 500.
Vinyl chloride	500.	< 500.
o-Xylene	200.	< 200.
m-Xylene	200.	< 200.
p-Xylene	200.	< 200.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Semi Volatile Aromatics	EPA SW-846 #8270	April 26, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-05	Drums "J" Block T065

ANALYTICAL RESULTS:
Units = ug/kg (ppb)

ACID COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Benzoicacid	2,500.	< 2,500.
Benzyl alcohol	1,000.	< 1,000.
2-Chlorophenol	1,000.	< 1,000.
2,4-Dichlorophenol	1,000.	< 1,000.
2,4-Dimethylphenol	1,000.	< 1,000.
4,6-Dinitrophenol	2,500.	< 2,500.
2,4-Dinitrophenol	2,500.	< 2,500.
2-Methylphenol	1,000.	< 1,000.
4-Methylphenol	1,000.	< 1,000.
2-Nitrophenol	2,500.	< 2,500.
4-Nitrophenol	2,500.	< 2,500.
4-Chloro-3-methylphenol	1,000.	< 1,000.
Pentachlorophenol	2,500.	< 2,500.
Phenol	1,000.	< 1,000.
2,4,6-Trichlorophenol	1,000.	< 1,000.
2,4,5-Trichlorophenol	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER: 1320-05

FIELD SAMPLE I.D. NUMBER: Drums "J" Block T065

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **BASE/NEUTRAL COMPOUNDS**

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Acenaphthene	1,000.	< 1,000.
Acenaphthylene	1,000.	< 1,000.
Aniline	1,000.	< 1,000.
Anthracene	1,000.	< 1,000.
Benzenethiol	1,000.	< 1,000.
Benzidine	5,000.	< 5,000.
Benz(a)anthracene	1,000.	< 1,000.
Benzo(a)pyrene	1,000.	< 1,000.
3,4-Benzo(b)fluoranthene	1,000.	< 1,000.
Benzo(g,h,i)perylene	2,500.	< 2,500.
Benzo(k)fluoranthene	1,000.	< 1,000.
bis(2-Chloroethoxy)methane	1,000.	< 1,000.
bis(2-Chloroethyl)ether	1,000.	< 1,000.
bis(2-Chloroisopropyl)ether	1,000.	< 1,000.
bis(2-Ethylhexyl)phthalate	1,000.	< 1,000.
4-Bromophenyl phenyl ether	1,000.	< 1,000.
4-Chloroaniline	1,000.	< 1,000.
Butylbenzyl phthalate	1,000.	< 1,000.
2-Chloronaphthalene	1,000.	< 1,000.
4-Chlorophenyl phenyl ether	1,000.	< 1,000.
Chrysene	1,000.	< 1,000.
Dibenz(a,h)acridine	2,500.	< 2,500.
Dibenz(a,h)anthracene	2,500.	< 2,500.
Dibenzofuran	1,000.	< 1,000.
1,2-Dichlorobenzene	1,000.	< 1,000.
1,3-Dichlorobenzene	1,000.	< 1,000.
1,4-Dichlorobenzene	1,000.	< 1,000.
3,3-Dichlorobenzidine	1,000.	< 1,000.
Diethylphthalate	1,000.	< 1,000.
1,2-Dimethylbenz(a)anthracene	1,000.	< 1,000.

BASE/NEUTRAL COMPOUNDS (continued)

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Dimethyl phthalate	1,000.	< 1,000.
Di-n-butyl phthalate	1,000.	< 1,000.
2,4-Dinitrotoluene	1,000.	< 1,000.
2,6-Dinitrotoluene	1,000.	< 1,000.
Di-n-octylphthalate	1,000.	< 1,000.
1,2-Diphenylhydrazine	1,000.	< 1,000.
Fluoranthene	1,000.	< 1,000.
Fluorene	1,000.	< 1,000.
Hexachlorobenzene	1,000.	< 1,000.
Hexachlorobutadiene	1,000.	< 1,000.
Hexachlorocyclopentadiene	1,000.	< 1,000.
Hexachloroethane	1,000.	< 1,000.
Indene	1,000.	< 1,000.
Indeno(1,2,3-cd)pyrene	2,500.	< 2,500.
Isophorone	1,000.	< 1,000.
1-Methylnaphthalene	1,000.	< 1,000.
2-Methylnaphthalene	1,000.	< 1,000.
2-Methylchrysene	1,000.	< 1,000.
Naphthalene	1,000.	< 1,000.
2-Nitroaniline	1,000.	< 1,000.
3-Nitroaniline	1,000.	< 1,000.
4-Nitroaniline	1,000.	< 1,000.
Nitrobenzene	1,000.	< 1,000.
N-Nitrosodimethylamine	1,000.	< 1,000.
N-Nitrosodi-n-propylamine	1,000.	< 1,000.
N-Nitrosodiphenylamine	1,000.	< 1,000.
Phenanthrene	1,000.	< 1,000.
Pyrene	1,000.	< 1,000.
Quinoline	1,000.	< 1,000.
1,2,4-Trichlorobenzene	1,000.	< 1,000.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
CONTACT: Lyman Thorpe
DATE RECEIVED: April 19, 1989
RECEIVED BY: Arlene McGill
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260	April 22, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-05	Drums "J" Block T066

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
Acetone	1,000	< 1,000.
Acrolein	1,000.	< 1,000.
Acrylonitrile	1,000.	< 1,000.
Benzene	200.	< 200.
Bromobenzene	200.	< 200.
Bromochloromethane	200.	< 200.
Bromodichloromethane	200.	< 200.
Bromoform	200.	< 200.
Bromomethane	500.	< 500.
2-Butanone	1,000.	< 1,000.
n-Butylbenzene	200.	< 200.
sec-Butylbenzene	200.	< 200.
tert-Butylbenzene	200.	< 200.
Carbon disulfide	200.	< 200.
Carbon tetrachloride	200.	< 200.
Chlorobenzene	200.	< 200.
Chloroethane	500.	< 500.
2-Chloroethyl vinyl ether	1,000.	< 1,000.
Chloroform	200.	< 200.
bis-2-Chloroisopropyl ether	500.	< 500.
Chloromethane	500.	< 500.
2-Chlorotoluene	200.	< 200.
4-Chlorotoluene	200.	< 200.
Dibromochloromethane	200.	< 200.
1,2-Dibromo-3-chloropropane	200.	< 200.

LAB SAMPLE I.D. NUMBER:
1320-06

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T066

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **VOLATILE ORGANIC ANALYTES**

ANALYTE	DETECTION LIMIT	RESULTS
1,2-Dibromoethane	200.	< 200.
Dibromomethane	200.	< 200.
1,2-Dichlorobenzene	200.	< 200.
1,3-Dichlorobenzene	200.	< 200.
1,4-Dichlorobenzene	200.	< 200.
Dichlorodifluoromethane	200.	< 200.
1,1-Dichloroethane	200.	< 200.
1,2-Dichloroethane	200.	< 200.
1,1-Dichloroethene	200.	< 200.
cis-1,2-Dichloroethene	200.	< 200.
trans-1,2-Dichloroethene	200.	< 200.
1,2-Dichloropropane	200.	< 200.
1,3-Dichloropropane	200.	< 200.
2,2-Dichloropropane	200.	< 200.
1,1-Dichloropropene	200.	< 200.
Ethylacetate	500.	< 500.
Ethylether	500.	< 500.
Ethylbenzene	200.	< 200.
Hexachlorobutadiene	200.	< 200.
2-Hexanone	500.	< 500.
Isopropylbenzene	200.	< 200.
p-Isopropyltoluene	200.	< 200.
Methylene chloride	200.	< 200.
4-Methyl-2-pentanone	500.	< 500.
Naphthalene	200.	< 200.
n-Propylbenzene	200.	< 200.
Styrene	200.	< 200.
1,1,1,2-Tetrachloroethane	200.	< 200.
1,1,2,2-Tetrachloroethane	200.	< 200.
Tetrachloroethene	200.	< 200.

VOLATILE ORGANIC ANALYTES (continued)

ANALYTE	DETECTION LIMIT	RESULTS
Toluene	200.	< 200.
1,2,3-Trichlorobenzene	200.	< 200.
1,2,4-Trichlorobenzene	200.	< 200.
1,1,1-Trichloroethane	200.	< 200.
1,1,2-Trichloroethane	200.	< 200.
Trichloroethene	200.	< 200.
Trichlorofluoromethane	200.	< 200.
1,2,3-Trichloropropane	200.	< 200.
1,1,2-Trichlorotrifluoroethane	200.	< 200.
1,2,4-Trimethylbenzene	200.	< 200.
1,3,5-Trimethylbenzene	200.	< 200.
Vinyl acetate	500.	< 500.
Vinyl chloride	500.	< 500.
o-Xylene	200.	< 200.
m-Xylene	200.	< 200.
p-Xylene	200.	< 200.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Semi Volatile Aromatics	EPA SW-846 #8270	April 26, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-06	Drums "J" Block T066

ANALYTICAL RESULTS:

Units = ug/kg (ppb)

ACID COMPOUNDS

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Benzoic acid	2,500.	< 2,500.
Benzyl alcohol	1,000.	< 1,000.
2-Chlorophenol	1,000.	< 1,000.
2,4-Dichlorophenol	1,000.	< 1,000.
2,4-Dimethylphenol	1,000.	< 1,000.
4,6-Dinitrophenol	2,500.	< 2,500.
2,4-Dinitrophenol	2,500.	< 2,500.
2-Methylphenol	1,000.	< 1,000.
4-Methylphenol	1,000.	< 1,000.
2-Nitrophenol	2,500.	< 2,500.
4-Nitrophenol	2,500.	< 2,500.
4-Chloro-3-methylphenol	1,000.	< 1,000.
Pentachlorophenol	2,500.	< 2,500.
Phenol	1,000.	< 1,000.
2,4,6-Trichlorophenol	1,000.	< 1,000.
2,4,5-Trichlorophenol	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-06

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T066

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **BASE/NEUTRAL COMPOUNDS**

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Acenaphthene	1,000.	< 1,000.
Acenaphthylene	1,000.	< 1,000.
Aniline	1,000.	< 1,000.
Anthracene	1,000.	< 1,000.
Benzenethiol	1,000.	< 1,000.
Benzidine	5,000.	< 5,000.
Benz(a)anthracene	1,000.	< 1,000.
Benzo(a)pyrene	1,000.	< 1,000.
3,4-Benzo(b)fluoranthene	1,000.	< 1,000.
Benzo(g,h,i)perylene	2,500.	< 2,500.
Benzo(k)fluoranthene	1,000.	< 1,000.
bis(2-Chloroethoxy)methane	1,000.	< 1,000.
bis(2-Chloroethyl)ether	1,000.	< 1,000.
bis(2-Chloroisopropyl)ether	1,000.	< 1,000.
bis(2-Ethylhexyl)phthalate	1,000.	< 1,000.
4-Bromophenyl ether	1,000.	< 1,000.
4-Chloroaniline	1,000.	< 1,000.
Butylbenzyl phthalate	1,000.	< 1,000.
2-Chloronaphthalene	1,000.	< 1,000.
4-Chlorophenyl phenyl ether	1,000.	< 1,000.
Chrysene	1,000.	< 1,000.
Dibenz(a,h)acridine	2,500.	< 2,500.
Dibenz(a,h)anthracene	2,500.	< 2,500.
Dibenzofuran	1,000.	< 1,000.
1,2-Dichlorobenzene	1,000.	< 1,000.
1,3-Dichlorobenzene	1,000.	< 1,000.
1,4-Dichlorobenzene	1,000.	< 1,000.
3,3-Dichlorobenzidine	1,000.	< 1,000.
Diethylphthalate	1,000.	< 1,000.
1,2-Dimethylbenz(a)anthracene	1,000.	< 1,000.

BASE/NEUTRAL COMPOUNDS (continued)

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
Dimethylphthalate	1,000.	< 1,000.
Di-n-butylphthalate	1,000.	< 1,000.
2,4-Dinitrotoluene	1,000.	< 1,000.
2,6-Dinitrotoluene	1,000.	< 1,000.
Di-n-octylphthalate	1,000.	< 1,000.
1,2 Diphenylhydrazine	1,000.	< 1,000.
Fluoranthene	1,000.	< 1,000.
Fluorene	1,000.	< 1,000.
Hexachlorobenzene	1,000.	< 1,000.
Hexachlorobutadiene	1,000.	< 1,000.
Hexachlorocyclopentadiene	1,000.	< 1,000.
Hexachloroethane	1,000.	< 1,000.
Indene	1,000.	< 1,000.
Indeno (1,2,3-cd) pyrene	2,500.	< 2,500.
Isophorone	1,000.	< 1,000.
1-Methylnaphthalene	1,000.	< 1,000.
2-Methylnaphthalene	1,000.	< 1,000.
2-Methyl chrysene	1,000.	< 1,000.
Naphthalene	1,000.	< 1,000.
2-Nitroaniline	1,000.	< 1,000.
3-Nitroaniline	1,000.	< 1,000.
4-Nitroaniline	1,000.	< 1,000.
Nitrobenzene	1,000.	< 1,000.
N-Nitrosodimethylamine	1,000.	< 1,000.
N-Nitrosodi-n-propylamine	1,000.	< 1,000.
N-Nitrosodiphenylamine	1,000.	< 1,000.
Phenanthrene	1,000.	< 1,000. J
Pyrene	1,000.	< 1,000. J
Quinoline	1,000.	< 1,000.
1,2,4-Trichlorobenzene	1,000.	< 1,000.

LAB SAMPLE I.D. NUMBER:
1320-06

FIELD SAMPLE I.D. NUMBER:
Drums "J" Block T066

ANALYTICAL RESULTS:

Units = ug/kg (ppb) **TENTATIVELY IDENTIFIED COMPOUNTS**

COMPOUND	DETECTION LIMIT	AMOUNT DETECTED
C_8 to C_{30} Aliphatic Hydrocarbons	1,000.	36,000. J
Dimethyl Phenanthrenes	1,000.	1,100. J
C_{15} to C_{25} Polycyclic Aliphatic Hydrocarbons	1,000.	55,000. J

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

SAMPLE 1320-SURROGATE RECOVERIES; VOCs

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260 Purge & Trap GC/MS	April 22, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-Surrogate Recoveries	Drums "J" Block T066

ANALYTICAL RESULTS:

Units = Percent (%) **SURROGATE RECOVERIES**

	Method Blank	1320 -3	1320 -4	1320 -5	1320 -6
d_4-1,2-Dichloroethane	97.9	50.4	52.3	51.3	50.1
d_8-Toluene	100.	85.4	92.4	93.9	94.5
1,4-Bromofluorobenzene	96.7	140.	141.	148.	145.

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

SAMPLE 1320-SURROGATE RECOVERIES; SVOCs

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Semi Volatile Aromatics	EPA SW-846 #8270	April 26, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-Surrogate Recoveries	Drums "J" Block T066

ANALYTICAL RESULTS:

Units = Percent (%)

SURROGATE RECOVERIES

	Method Blank	1320 -3	1320 -4	1320 -5	1320 -6
2-Fluorophenol	62.7	53.4	53.9	56.8	50.1
d_5-Phenol	68.3	62.5	61.9	64.0	60.1
d_5-Nitrobenzene	60.0	50.6	51.0	53.0	49.6
2-Fluorobphenyl	67.8	59.6	62.5	63.7	60.8
2,4,6-Tribromophenol	52.0	57.1	54.7	61.2	46.9
d_{14}-Terphenyl	98.8	105.	104.	109.	83.9

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989

SAMPLE 1320-MATRIX SPIKE RECOVERIES; VOCs

ORGANIC ANALYSIS REPORT

CLIENT: Tooele Army Depot
DATE RECEIVED: April 19, 1989
SET IDENTIFICATION NUMBER: 1320
DESCRIPTION: Four-Tar-Like Solids

CONTACT: Lyman Thorpe
RECEIVED BY: Arlene McGill

Analysis Requested:	Method Ref. Number:	Date Analyzed:
Volatile Organics	EPA SW-846 #8260 Purge & Trap GC/MS	April 22, 1989

Eao Sample I.D. Number:	Field Sample I.D. Number:
1320-Matrix Spike Recoveries	Drums "J" Block T066

ANALYTICAL RESULTS:

Units = Percent (%) **MATRIX SPIKE RECOVERIES**

	Spike	Duplicate	Relative % Difference
trans-1,2-Dichloroethene	35.4	33.1	6.7
Benzene	70.0	69.3	1.0
Trichloroethene	91.0	89.6	1.6
_____	79.3	78.8	0.6
Chlorobenzene	116.	115.	0.9

SOURCE: AMERICAN WEST ANALYTICAL LABORATORIES, June 5, 1989